

*Arithmetic*  
*for*  
*Everyday Use*  
*Book 4*

by

G. F. Pew  
and  
W. H. Jennings

CURRICULUM

QA  
135  
P51  
bk. 4

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CURR HIST

## TO THE STUDENT

### 1. STUDY THE INSTRUCTIONAL MATERIAL GIVEN WITH EACH UNIT.

Basically, arithmetic is a matter of addition, subtraction, multiplication and division. Commercial arithmetic involves the application of these fundamental operations to business transactions. It is obvious, therefore, that you must become familiar with business practices in order to apply the principles of arithmetic to business transactions.

Each unit in this workbook illustrates and provides practice in applying basic operations to business problems. A minimum of instructional material, which is intended to provide a basis for class-room discussion on the topic, is followed immediately by a wealth of exercise material. As far as has been considered feasible, the applications have been chosen from assignments likely to be encountered by the student entering business in any locality.

### 2. PRODUCE THE KIND OF WORK THAT WOULD BE ACCEPTABLE TO AN EMPLOYER.

To meet this objective, your work must be:

- (1) *Accurate.* Check carefully all addition, subtraction, multiplication, and division, to ensure accuracy in all your work.
- (2) *Neat and legible.* Be particularly careful in making figures; illegible figures cause errors. Set up your solution in a neat, logical form. Let the answer to the solution stand out distinctly.
- (3) *Grammatically correct.* The wording of a solution to a problem should be grammatically correct. Be particularly careful in using the ditto and the equal signs.

### 3. COMPLETE YOUR ROUGH CALCULATIONS ON THE BLANK SHEETS PROVIDED AT THE BACK OF THE BOOK.

### 4. COMPLETE THE REVIEW ASSIGNMENT FOR EACH UNIT BEFORE PROCEEDING TO THE NEXT UNIT.

### 5. KEEP YOUR FINISHED WORK AVAILABLE FOR REVIEW PURPOSES.

Your solutions to the problems in this book will be written immediately after the statement of the problem. You will find this arrangement very convenient when reviewing completed work in preparation for tests and examinations. Of course, the effectiveness of your review will depend upon the accuracy of your original work.

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# UNIT 1

## FUNDAMENTAL OPERATIONS

### ADDITION AND SUBTRACTION OF WHOLE NUMBERS

1. In the following tabulation, the Accounts Receivable column shows the amounts charged to customers; the Sales Discount column shows the discount given in each case. By subtraction, find the amount of Cash Received. Total the columns and prove. Make your figures neat and legible.

(1)

(2)

ACCOUNTS RECEIVABLE						SALES DISCOUNT				CASH RECEIVED				ACCOUNTS RECEIVABLE						SALES DISCOUNT				CASH RECEIVED													
\$	1	2	3	7	5	0	\$			2	4	7	5	\$					\$	1	6	0	8	3	2	\$		4	8	2	5	\$					
			7	6	3	4	8				3	8	1	7							9	9	6	2	7			3	9	8	5						
			8	9	0	3	4				1	7	8	1							1	7	3	8	2	4			1	7	3	8					
			3	8	2	6	5				1	1	4	8								2	5	8	6	0			1	2	9	3					
	4	8	6	3	2	5				2	4	3	1	6								6	3	8	6	5			1	9	1	7					
			9	7	5	5	0				1	9	5	1								1	5	6	3	6	3			1	5	6	4				
			5	4	3	8	7				5	4	3	9									4	8	9	0				9	7						
\$							\$							\$					\$							\$						\$					

2. The following represent the Debit and Credit columns of ledger accounts. Find the daily balance and prove the final balance by totals.

(1)

(2)

DEBIT					CREDIT				BALANCE				DEBIT					CREDIT				BALANCE											
\$	7	2	6	4	8	\$					\$					\$	1	4	8	2	8	5	\$					\$					
							5	1	6	0	0							1	2	7	5	0	0										
	1	2	1	7	5	0		1	3	5	0	0	0										2	5	0	0	0	0					
		9	6	5	7	5												8	7	8	7	5											
								2	7	5	0	0	0											3	5	0	0	0					
								1	5	0	0	0	0											5	5	0	0	0					
		1	8	5	9	5												1	7	6	2	5											
								5	7	5	0	0	0					4	2	8	7	6											
		4	9	5	9	0																		5	7	5	0	0					
\$							\$							\$									\$					\$					

## MULTIPLICATION AND DIVISION OF WHOLE NUMBERS

### Short Cuts in Multiplication

- (1) To multiply by 25, multiply by 100 and divide the result by 4.
- (2) To multiply by 125, multiply by 1,000 and divide the result by 8.
- (3) To multiply a number by 99, multiply by 100 and subtract the number.
- (4) To multiply a number by 101, multiply by 100 and add the number.

1. Complete the following extensions, using short cuts where possible.

1	525 articles @ \$ 25		9	225 articles @ \$ 99	
2	240    "    "    25		10	148    "    "    101	
3	368    "    "    200		11	216    "    "    99	
4	426    "    "    125		12	118    "    "    101	
5	256    "    "    125		13	315    "    "    99	
6	148    "    "    250		14	196    "    "    101	
7	96    "    "    250		15	325    "    "    99	
8	192    "    "    125		16	112    "    "    99	

### Short Cuts in Division

- (1) To divide a number by 10, 100, etc., move the decimal point in the number as many places to the left as there are zeros in the divisor.
- (2) To divide a number by 25, divide the number by 100 and multiply the result by 4.
- (3) To divide a number by 50, divide the number by 100 and multiply the result by 2.
- (4) To divide a number by 125, divide the number by 1,000 and multiply the result by 8.

2. Divide as indicated, using short cuts where possible.

1	4,370 divided by 10		9	7,204 divided by 25	
2	876    "    "    50		10	8,760    "    "    40	
3	7,250    "    "    25		11	5,860    "    "    60	
4	7,500    "    "    125		12	3,215    "    "    50	
5	3,867    "    "    300		13	1,500    "    "    1,000	
6	4,630    "    "    125		14	1,350    "    "    125	
7	3,950    "    "    25		15	215    "    "    25	
8	7,580    "    "    125		16	326    "    "    50	

# ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION OF FRACTIONS

1. Complete the operations indicated in each of the following exercises.

(1) $\frac{7}{10} + \frac{7}{12}$	(2) $3\frac{1}{3} + 6\frac{1}{4}$	(3) $\frac{5}{6} - \frac{3}{4}$
(4) $11\frac{1}{2} - 5\frac{2}{3}$	(5) $9 \times \frac{4}{5} \times \frac{5}{8}$	(6) $4\frac{3}{8} \times 8\frac{2}{3}$
(7) $\frac{48}{5} \div 7$	(8) $95 \div \frac{5}{6}$	(9) $72\frac{5}{8} \div 18\frac{1}{4}$
(10) $\frac{7}{8}$ of $4\frac{1}{2} \div \frac{7}{16}$	(11) $\frac{1}{2} \times (\frac{5}{6} + \frac{2}{3})$	(12) $\frac{\frac{3}{4}}{\frac{5}{7}}$
(13) $\frac{\frac{2}{3}}{\frac{5}{6}} + \frac{\frac{3}{4}}{\frac{3}{8}}$	(14) $\frac{8\frac{1}{2}}{3\frac{1}{4} - 1\frac{1}{8}}$	(15) $\frac{2600}{1 + \frac{5}{100} \times \frac{292}{365}}$

# ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION OF DECIMALS

1. Copy the following exercises in the spaces provided and complete the operations indicated.

(1) $2.25 + 101.3$ (2) $.268 + 32.09$ (3) $3.2 - .0875$ (4) $8.408 - 5$	(1)	(2)	(3)	(4)

2. Multiply mentally and place the decimal point correctly.

(1) $101 \times .5$		(4) $10.1 \times 50$	
(2) $1.01 \times .005$		(5) $.0101 \times .050$	
(3) $.101 \times 5$		(6) $10.1 \times .005$	

3. Divide mentally and place the decimal point correctly.

(1) $96 \div .12$		(4) $.96 \div .012$	
(2) $.96 \div 12$		(5) $.96 \div 120$	
(3) $9.6 \div 1.2$		(6) $960 \div 1.20$	

4. Express the following decimals as fractions in their lowest terms.

(1) .375	(2) .0025	(3) $.66\frac{2}{3}$	(4) 5.125	(5) 2.875
(6) .625	(7) .1785	(8) $1.16\frac{2}{3}$	(9) $.83\frac{1}{3}$	(10) $.8\frac{1}{3}$

5. Express the following fractions as decimals. Indicate the method used.

(1) $3/25$	(2) $8\frac{5}{8}$	(3) $3/400$	(4) $14\frac{3}{4}$	(5) $6\frac{3}{16}$
(6) $7\frac{5}{12}$	(7) $1/200$	(8) $3/800$	(9) $16\frac{1}{6}$	(10) $8\frac{4}{5}$

# EQUIVALENT VALUES—FRACTIONS, DECIMALS AND PERCENTAGES

1. Express the following fractions as percentages. Indicate the method used.

(1) $\frac{2}{5}$	(4) $\frac{1}{16}$	(7) $2\frac{5}{8}$
(2) $1\frac{3}{4}$	(5) $\frac{3}{8}$	(8) $\frac{2}{3}$
(3) $4\frac{1}{2}$	(6) $\frac{3}{400}$	(9) $\frac{7}{12}$

2. Express the following percentages as fractions. Indicate the method used.

(1) 5%	(4) $62\frac{1}{2}\%$	(7) .75%
(2) $37\frac{1}{2}\%$	(5) 125%	(8) .125%
(3) $\frac{1}{4}\%$	(6) 220%	(9) .375%

3. Express the following decimals as percentages. Indicate the method used.

(1) .025	(4) .375	(7) 3.75
(2) .3	(5) .0025	(8) 12
(3) 2.5	(6) .005	(9) $.066\frac{2}{3}$

4. Express the following percentages as decimals. Indicate the method used.

(1) 150%	(4) 45%	(7) .25%
(2) $37\frac{1}{2}\%$	(5) $4\frac{1}{2}\%$	(8) $16\frac{2}{3}\%$
(3) $6\frac{1}{4}\%$	(6) .5%	(9) $33\frac{1}{3}\%$

5. In the blank spaces provided, show the required equivalents.

No.	FRACTION	DECIMAL	PERCENTAGE	No.	FRACTION	DECIMAL	PERCENTAGE
1	$\frac{1}{2}$			9			10%
2		$.33\frac{1}{3}$		10	$\frac{1}{6}$		
3			25%	11		$.8\frac{1}{3}$	
4	$\frac{1}{5}$			12			$33\frac{1}{3}\%$
5		$.16\frac{2}{3}$		13	$\frac{1}{4}$		
6			$14\frac{2}{7}\%$	14		.20	
7	$\frac{1}{8}$			15			$16\frac{2}{3}\%$
8		.5		16	$\frac{1}{16}$		



# PROBLEMS INVOLVING FRACTIONS, DECIMALS AND PERCENTAGES

Show the form of solution and the answer for each of these exercises.

1. Express 25% of $\frac{3}{8}$ as a fraction.	
2. $91\frac{2}{3}$ cents is what fraction of \$1?	
3. By how much is $\frac{11}{12}$ smaller than $\frac{15}{16}$ ?	
4. Change $2\frac{1}{2}/7\frac{1}{2}$ to a per cent.	
5. 54 is what per cent larger than 36?	
6. A 5% discount on a certain sale price is \$7.25. What is the net amount of sale?	
7. $\frac{5}{6}$ is what per cent larger than $\frac{1}{2}$ ?	
8. $\frac{1}{4}\%$ of \$16.80 is how much?	
9. \$40 less 20% and 10% — Find the amount of the discount.	
10. What number increased by $12\frac{1}{2}\%$ of itself equals 108?	
11. $\frac{1}{8}$ is what per cent of $\frac{1}{4}$ ?	
12. 125% of a number is 45. What is the number?	
13. What number is 150% more than 36?	
14. Express 175% as a decimal.	
15. Simplify: $\frac{7}{8} \div \frac{3}{5} + \frac{1}{4}$	

PROBLEMS INVOLVING FRACTIONS, DECIMALS AND PERCENTAGES

16. Express $.11\frac{7}{8} \div 1\frac{1}{4}$ as a fraction.	
17. 57 mills per \$1 is how many dollars per \$100?	
18. Express $37\frac{1}{2}\% \div .5$ as a decimal.	
19. 450 is what per cent of $112\frac{1}{2}$ ?	
20. What number is 60% less than 240?	
21. What per cent of 375 is 250?	
22. What number divided by $37\frac{1}{2}$ gives a quotient of $1\frac{1}{4}$ ?	
23. Express 450 pounds as a decimal fraction of a ton.	
24. Express 45 pounds of potatoes as a per cent of one bushel of potatoes.	
25. Express 20 seconds as a per cent of an hour.	
26. Express $5\frac{2}{3}$ cubic feet as a decimal fraction of a cubic yard.	
27. What per cent is 220 yards of one mile?	
28. What per cent is 9 inches of one yard?	
29. What per cent is 40 ounces of one pound (Avoir.)?	

# PROBLEMS INVOLVING FRACTIONS, DECIMALS AND PERCENTAGES

30. Express 3 quarts as a per cent of one pint.	
31. Express 242 square yards as a per cent of one acre.	
32. Express 3 rods as a decimal fraction of 150 yards.	
33. Express a yard as a per cent of one metre.	
34. What per cent of a kilogram is one pound?	
35. What per cent is a litre of one gallon?	
36. What per cent is one acre of one hectare?	
37. By what fraction is one mile more than one kilometre?	
38. What per cent of a litre is one pint?	
39. Express 5 miles in kilometres.	
40. Express 3 hectares in acres.	
41. What per cent is one centimetre of one inch?	
42. How many centimetres make one foot? Show any fraction as a decimal.	
43. Express one U.S.A. gallon as a per cent of one Imperial gallon.	

## UNIT 2

### MISCELLANEOUS TOPICS

#### AVERAGE AND MEDIAN

An *Average* is a medium sum or quantity made out of unequal sums or quantities.

EXAMPLE—The marks of 9 students in an arithmetic test are 67, 62, 71, 58, 57, 75, 74, 82 and 66, respectively. What is the average mark?

The sum of the marks obtained = 612.

The number of students = 9.

The average mark =  $612 \div 9 = 68$ .

The *Median* is the value of the middle sum or quantity when sums or quantities are arranged according to size.

EXAMPLE—To find the median mark of the 9 students for which we have found the average in the first example, arrange the marks in numerical order: 57, 58, 62, 66, 67, 71, 74, 75, 82. The middle number of the nine is the fifth, 67. This is the median.

If the number of students were an even number, the median is the average of the two middle numbers.

EXAMPLE—The marks of 10 students are 57, 58, 62, 66, 67, 71, 74, 75, 82, and 85.

The median is the average of the two middle numbers, 67 and 71.

Average of 67 and 71 =  $\frac{67 + 71}{2} = 69$ .

1. Find the average and the median of the following series of numbers.

SERIES	AVERAGE	MEDIAN
(1) 16, 24, 18, 42, 19, 27, 52, 38, 29		
(2) 78, 46, 92, 87, 58, 55, 49, 66, 72, 81		
(3) 58, 25, 75, 67, 82, 63, 97, 48, 63, 95, 90		
(4) 38, 64, 49, 82, 76, 43, 77, 92, 86, 75, 67, 48		
(5) 12, 18 49, 64, 62, 87, 29, 42, 11, 87, 24, 36, 19		

2. In a school, the ages of 82 Grade 12 pupils were as follows: 12 of age 15, 30 of age 16, 25 of age 17, and 15 of age 18. What was the average age of the pupils?

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.....

3. During the strawberry season, a fruit market made sales as follows: 55 boxes at 50¢ each, 150 at 35¢, 300 at 31¢, 80 at 45¢, and 35 at 48¢. What was the average selling price per box?

.....

.....

.....

.....

.....

.....

# WAREHOUSE STORAGE ACCOUNTS

The following example illustrates how a warehouse calculates storage charges on goods that are stored for and delivered to a customer at frequent intervals. Assume that the storage rate is 10 cents per day-unit per month.

DATE	UNITS RECEIVED	UNITS DELIVERED	BALANCE	NO. OF DAYS STORED	NO. OF DAY-UNITS
19-- SEPT. 1	150		150	6	$6 \times 150 = 900$
7		50	100	3	$3 \times 100 = 300$
10	200		300	5	$5 \times 300 = 1,500$
15		150	150	5	$5 \times 150 = 750$
20	150		300	10	$10 \times 300 = 3,000$
	TOTAL DAY-UNITS =				6,450
	CHARGES = $\frac{6,450 \times .10}{30} = \$21.50$				

Complete the following storage accounts according to the above example, and find the storage charges at the rate of 12 cents per day-unit per month.

(1)

DATE	UNITS RECEIVED	UNITS DELIVERED	BALANCE	NO. OF DAYS STORED	NO. OF DAY-UNITS
19-- OCT. 1	156				
15		125			
20	215				
28		150			
29	90				
	TOTAL DAY-UNITS =				
	CHARGES =				

(2)

DATE	UNITS RECEIVED	UNITS DELIVERED	BALANCE	NO. OF DAYS STORED	NO. OF DAY-UNITS
19-- Nov. 1	180				
17		160			
20	320				
22	140				
25		325			
	TOTAL DAY-UNITS =				
	CHARGES =				



# WAREHOUSE STORAGE ACCOUNTS

(3)

DATE	UNITS RECEIVED	UNITS DELIVERED	BALANCE	NO. OF DAYS STORED	NO. OF DAY-UNITS
19-- JULY 8	175				
11		89			
17	93				
25		136			
31	112				
	TOTAL DAY-UNITS =				
CHARGES =					

(4)

DATE	UNITS RECEIVED	UNITS DELIVERED	BALANCE	NO. OF DAYS STORED	NO. OF DAY-UNITS
19-- AUG. 1	65				
2	83				
16		21			
28		82			
30	145				
	TOTAL DAY-UNITS =				
CHARGES =					

(5)

DATE	UNITS RECEIVED	UNITS DELIVERED	BALANCE	NO. OF DAYS STORED	NO. OF DAY-UNITS
19-- DEC. 3	214				
10		87			
15	63				
20		124			
28		32			
	TOTAL DAY-UNITS =				
CHARGES =					

## COST OF OWNING AND OPERATING AN AUTOMOBILE

The following example illustrates the factors to be considered in calculating the cost of owning and operating an automobile.

EXAMPLE—A purchased an automobile costing \$2,500 with the proceeds from the sale of Government bonds on which he was receiving interest at the rate of 3% annually. At the end of the first year of operation, A found that he had driven the car 10,110 miles; had paid out \$274.50 for gasoline, oil and lubrication; \$53.75 for repairs and incidentals; \$120 for insurance; and \$60 for garage rent. At this time, A had the automobile appraised for value and was offered \$1,900 on a turn-in deal. Considering these facts, what was the average cost per mile of operating the automobile?

Loss of interest on bonds used for the purchase — 3% annually on \$2,500.00.....	\$ 75.00
Gasoline, oil and lubrication .....	274.50
Repairs and incidentals .....	53.75
Insurance .....	120.00
Garage rent .....	60.00
Depreciation for the year.....	600.00
Total .....	<u>\$1,183.25</u>

Average cost per mile =  $\$1,183.25 \div 10,110 = 11.7$  cents.

PROBLEM 1. Find the average cost per mile of operating an automobile, using the following data: Cost of the automobile, \$2,825; mileage for the year, 8,780; average mileage per gallon of gasoline, 18; average cost of gasoline, 41.3 cents per gallon; changes of oil — 9 times during the year using 4 quarts at each change, at a cost of 55 cents a quart; lubrication, \$1.50 at each oil change; licenses, repairs and incidentals for the year, \$60.85; insurance for the year, \$135.00; depreciation for the year estimated to be 25% of the cost of the automobile; estimated loss of interest on the money invested in the automobile, 5% per annum. The owner keeps the car in his own garage, but considers that if he were not using it himself, he could rent it for at least \$4.50 per month. (Your answer to this problem should show a higher rate than shown in the example. Compare the two problems and give your reasons for the difference in rates).

# COST OF OWNING AND OPERATING AN AUTOMOBILE

2. Using the data given below, find the average cost per mile to operate each automobile. Show solutions in the spaces provided.

	CAR A	CAR B	CAR C	CAR D
Purchase price of the car.....	\$2,585	\$1,680	\$ 2,915	\$ 3,225
Depreciation rate on cost for the year.....	30%	30%	25%	20%
Mileage for the year.....	9,650	8,725	10,600	15,320
Average miles per gallon of gasoline.....	18	35	17	15
Average price of gasoline per gallon.....	41.3¢	41.3¢	42.5¢	41.8¢
Number of oil changes and lubrications at \$3.70.....	10	9	11	15
Insurance for the year.....	\$135	\$85	\$140	\$155
Garage rent per month.....	\$5	\$4	\$5.50	\$6
Repairs and incidentals.....	\$74.50	\$58.00	\$85.70	\$92.25
Loss of interest on investment in the car — rate per annum.	5%	5%	5%	5%

CAR A

CAR B

CAR C

CAR D

# GENERAL PRACTICE IN FUNDAMENTAL OPERATIONS

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
\$3.89	\$5.83	\$6.25	\$8.92	\$9.46	\$4.73	\$7.48	\$5.65
4.37	5.94	8.49	3.97	2.87	4.98	6.48	9.45
9.56	8.67	7.56	6.45	5.45	4.34	2.34	3.23
2.34	3.45	5.67	6.78	7.89	2.89	3.78	4.67
5.56	6.45	7.34	8.23	7.27	6.29	5.38	4.47
9.67	5.87	3.56	7.46	3.87	9.56	8.75	9.75
5.75	3.87	5.55	7.86	6.85	9.85	7.85	4.85
6.54	8.54	9.64	7.83	7.93	5.64	3.75	9.24
9.56	9.45	4.89	6.52	7.25	7.84	5.84	8.24
7.35	7.95	2.85	4.65	3.75	4.86	6.75	4.95

2. Fill in the required equivalents.

No.	FRACTION	DECIMAL	PER CENT	No.	FRACTION	DECIMAL	PER CENT
1	$\frac{5}{16}$			6			250%
2		.015		7	$\frac{1}{2}/2\frac{1}{2}$		
3			$2\frac{1}{2}\%$	8		2.125	
4	$1\frac{1}{6}$			9			.05%
5		.3 $\frac{1}{3}$		10	$2\frac{1}{2}/2$		

3. Prorate rental expense to departments according to fractional proportion of floor space. For example,  $\frac{1}{4}$  of the floor space should bear  $\frac{1}{4}$  of the total expense.

4. Find what per cent (correct to 2 decimal places) the floor space is of the total floor space and distribute expenses to departments on this basis.

DEPT.	FLOOR SPACE	RENTAL EXPENSE	DEPT.	FLOOR SPACE	PER CENT OF SPACE	EXPENSES
A	2,563 Sq. Ft.		A	2,563 sq. ft.		
B	872 " "		B	872 " "		
C	461 " "		C	461 " "		
D	266 " "		D	266 " "		
E	348 " "		E	348 " "		
F	1,275 " "		F	1,275 " "		
TOTAL		\$8 2 7 5 75	TOTAL			\$8 8 1 2 5 0



## UNIT 3

### MERCHANDISING

#### TRADE AND CASH DISCOUNTS

It is common practice for the wholesaler or the manufacturer to prepare a catalogue of the goods he sells or manufactures for the retailer. The article is usually priced in the catalogue at a *list price*, less a discount known as a *trade discount*; for example, list \$75 less 20%. The net price to the retailer would then be \$60.

If the retailer's order is a large one, an additional discount may be given; for example, list \$75 less 20% and 10%. The calculation of the net price then is as follows:

List	\$75.00
Less 20%	15.00
	<hr/> 60.00
Less 10%	6.00
	<hr/> 54.00
Net price	

Note that the second discount is calculated on and deducted from the remainder after the first discount has been deducted. Any additional discounts would be calculated in the same way.

The total discount is \$75 - \$54 = \$21.

Instead of issuing a new catalogue when prices change, the wholesaler or manufacturer may send the retailer a *Discount Sheet*, which gives the new rates of discount. For example, the price quoted above may be changed to \$75 less 20%, 10%, and 5%. The new net price would now be 5% less than the previous net price; thus, \$54 less 5% would be \$51.30.

The following example of an invoice will illustrate the method of applying and calculating trade and cash discounts.

<b>LOWE WHOLESALE CO. LTD.</b> Edmonton, Alberta		
Sold to: Thompson Hardware, Tecumseh Blvd., Edmonton, Alta.	Date: October 1, 19—  Terms: 2/10, n/30	
25 Door Locks No. 4865 <div style="text-align: right; margin-right: 50px;">Less 20% and 10%</div>	<div style="display: flex; justify-content: space-between;"> <span>@ \$10.45 each</span> <span>\$ 261.25</span> </div> <div style="text-align: right; margin-right: 50px;">73.15</div> <div style="text-align: right; margin-right: 50px;"><u>\$ 188.10</u></div>	

*Cash Discount*—Observe that the terms of the above invoice are 2/10, n/30, meaning that if the invoice is paid within 10 days from its date, 2% will be allowed off the net price; otherwise, the invoice is payable in full within 30 days. The terms of 2/10 E.O.M. signify that 2% will be allowed if the bill is paid within 10 days from the end of the month in which the invoice is dated.

In the space below, prove the discount reduction shown on the above invoice and show the amount payable if paid within 10 days from its date, October 1, 19—.

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## TRADE AND CASH DISCOUNTS

1. Calculate the amount paid on each of the following invoices.

No.	LIST PRICE	TRADE DISCOUNT	TERMS	DATE OF INVOICE	DATE PAID	AMOUNT PAID
1	\$144.00	10% and 10%	2/10 n/30	Oct. 5	Oct. 10	
2	225.00	15% " 5%	1/10 E.O.M.	Oct. 8	Nov. 8	
3	368.50	20% " 5%	2/30 n/60	Oct. 1	Oct. 30	
4	428.85	12½% " 10%	1/10 n/30	Oct. 15	Oct. 31	
5	496.20	20% " 10%	2/10 E.O.M.	Oct. 10	Nov. 10	

A trade discount series may be changed to a single discount equivalent.

EXAMPLE—What single discount is equivalent to a series of 20% and 10%?

2. Find the single discount equivalent for each of the following series.

Let the list price be \$100.00  
Deduct 20%      20.00

80.00

Deduct 10%      8.00

\$ 72.00

The total discount is seen to be \$28.  
Since this is \$28 off \$100, the per cent deducted is 28%.

No.	DISCOUNT SERIES	SINGLE DISCOUNT EQUIVALENT
1	20% and 20%	
2	25% " 20%	
3	15%, 10% and 5%	
4	20%, 10% " 5%	
5	25%, 12½% and 10%	

3. Show your solutions for the following exercises.

(1) A retailer paid \$144.00 for goods on which he had been allowed a trade discount of 20% and 10%. What was the list price of the goods?

(2) A retailer took advantage of a 2% cash discount and paid \$164.64 for goods listed at \$280.00. What was the rate of the trade discount allowed?

## MARKUP AND MARKDOWN

While the wholesaler or manufacturer allows the retailer a trade discount, he must also make a profit for himself, and his list price must be calculated with this in mind. The amount or per cent which the seller adds to his cost is generally known as *markup*. The per cent of markup is based on *cost*. A *markdown* is a reduction of the selling price.

EXAMPLE—A manufacturer produces an article at a cost of \$30. At what price should he list it in his catalogue so that he may allow the retailer trade discounts of 20% and 10% and still realize a markup of 20% on his cost?

The solution resolves itself into three steps:

- (1) Finding the manufacturer's net selling price:

The cost of \$30 (the base) = 100%.

Markup = 20% of cost.

Net selling price = 120% of cost.

$\frac{120}{100}$  of \$30 = \$36 or 20% of \$30 = \$6; \$30 + \$6 = \$36.

- (2) Finding the single discount equivalent of the trade discounts:

100% less 20% = 80%; 80 less 10% = 72%. The single discount equivalent is therefore 100% - 72%, or 28%.

- (3) Finding the list price:

The list price (the base) = 100%.

Trade discounts of 20% and 10% = 28% of the list price.

The net selling price of \$36 = 72% of the list price.

Therefore, the list price is  $\frac{100}{72}$  of \$36 = \$50.

1. Prove that \$50 is the correct list price for the above problem.

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2. A manufacturer sold goods for \$104 after making a markup of 30% of his cost. What was his cost?

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## MARKUP AND MARKDOWN

3. A manufacturer's list price of certain goods was \$60 less 10% and 10%. If the goods cost him \$35.68, what was his per cent of markup?

4. A manufacturer produced porcelain-top tables at a cost of \$15 each. At what price should he list them in his catalogue so that he may allow the retailer trade discounts of  $33\frac{1}{3}\%$  and 10% and still make a markup of 20% of his cost?

5. The retailer who bought the tables referred to in Problem 4 paid \$1.50 freight on each table. He marked up the tables 50% of the laid-down cost (invoice price plus freight). What was his selling price?

6. The retailer referred to in Problem 4 was compelled later to reduce his price to clear his stock of tables. If the tables were then advertised at a 20% discount on the original selling price, what was the reduced selling price, and what per cent of markup was realized after the markdown?

## MARKUP AND MARKDOWN

7. A jobber imported 100 watches invoiced at \$23.50 each. Duty on the purchase was 20%, and express and other charges amounted to \$12.50. He marked up the watches 30% of his total cost. He sold 48 of them at this price, 36 of them at a reduction of 10%, and the remainder at a further reduction of 15%. What was his gain on the transaction?

8. A manufacturer sells directly to retailers and wholesalers. He allows wholesalers a discount of 40%, and retailers a discount of 20%. If the wholesaler marks up his price 30% when he sells to the retailer, would the retailer be better off to buy direct from the manufacturer or from the wholesaler?

9. In Problem 8, what would it cost a retailer for 20 boxes of chocolates which are listed by the manufacturer at \$3.20 a box; (a) If he bought from the wholesaler? (b) If he bought from the manufacturer? What would he gain in each case if he sold them at the manufacturer's list price?



# MARGIN OF PROFIT ON SALES

When the per cent of profit is considered in relation to the operation of the business as a whole, it is usually based on *sales*. Profit based on sales is generally referred to as *margin*. The business man speaks of operating on a certain gross margin of profit. This margin should be sufficient to cover the operating expenses and yield a net profit. An analysis of the operating statement, generally called the Profit and Loss Statement, in terms of percentages based on sales is a most useful aid in determining operational policy.

EXAMPLE—

## THE A. B. C. COMPANY Profit and Loss Statement for the period January 1, 19— to December 31, 19—

Sales.....	\$120,000	100%
Cost of Goods Sold.....	72,000	60%
Gross Trading Margin.....	48,000	40%
Total Operating Expenses.....	30,000	25%
Net Profit.....	<u>\$ 18,000</u>	<u>15%</u>

1. Complete the following statement and compare business operations for 1957 and 1958 by calculating percentages (to the nearest whole number) based on sales. Show the change in per cent by using + or - for increase or decrease, respectively.

	1957		1958		CHANGE %
	AMOUNT	%	AMOUNT	%	
Sales.....	\$118,500	100%	\$165,000	100%	
Cost of Goods sold.....	82,950		115,500		
Gross Margin of Profit.....					
Total Operating Expenses.....	23,700		41,250		
Net Profit.....					

2. Complete the following comparative statement by computing the missing amount or per cent, as the case may be. Show the change per cent (+ or - representing increase and decrease, respectively).

	1957		1958		CHANGE %
	AMOUNT	%	AMOUNT	%	
Sales.....	\$8,560	100%		100%	
Cost of Goods Sold.....			\$6,360	60%	
Gross Margin of Profit.....		35%			
Total Operating Expenses.....	2,140				
Net Profit.....			\$1,272		



## MARKUP REQUIRED TO PROVIDE A SPECIFIED MARGIN OF PROFIT

The per cent of profit by which a merchant marks up his goods may be determined by having to meet the prices of his competitors in the same line of merchandise. If possible, however, the markup will be that per cent which will give him a specific per cent of gross margin on his sales. Since markup is based on cost and margin on sales, the percentages will be different.

EXAMPLE—What per cent of markup on goods will be required in order to meet a standard of a 40% margin on sales?

Sales = 100%.  
Less Gross Margin on Sales = 40%.  
Therefore, the Cost of Goods Sold = 60% of sales.

The markup is seen to be  $\frac{40}{60}$  of the cost, and  $\frac{40}{60} \times 100 = 66\frac{2}{3}\%$ .

Therefore, a margin of profit of 40% on selling price is equivalent to a markup of 66 $\frac{2}{3}$ % on cost.

1. Goods costing \$120 are marked up 50% of cost. What is the gross margin of profit on the selling price?

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3. A merchant operates on a 45% gross margin on sales. What would be the per cent of markup on goods costing \$225?

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2. Goods costing \$15 are marked up to \$18. What is the per cent of the gross margin of profit?

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4. A merchant marks up his goods 50% on cost. What is his gross trading margin?

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# MARKUP REQUIRED TO PROVIDE A SPECIFIED MARGIN OF PROFIT

5. The following invoice was received by the C. D. Smith Company.

<p><b>KENNY GLOVE MANUFACTURING COMPANY</b>  6216 Pelissier Street  Montreal, Quebec</p>			
<p>Sold to: C. D. Smith Company  1245 Pitt Street North  Montreal, Quebec</p>		<p>Date: November 15, 19—  Terms: 2/10, n/30  Via: Our delivery</p>	
QUANTITY	ITEM	PRICE	AMOUNT
12 doz. pr.	Men's Knitted Gloves	\$ 9.95 dozen	\$119.40
30 " "	" Capeskin "	11.75 "	352.50
10 " "	" Canvas Work Gloves	3.95 "	39.50
15 " "	Women's Knitted Gloves	8.85 "	132.75
15 " "	" Suede "	13.10 "	196.50
25 " "	Children's Wool Mitts	5.95 "	148.75
			<u>\$989.40</u>

The C. D. Smith Company lists merchandise to provide the following margins on the selling price: Men's Department, 30%; Women's Department, 33½%; Children's Department, 25%. What is the selling price per pair for each of the six kinds of gloves in the above invoice?

6. A jobber received a shipment of 24 golf-bag carts, invoiced to him at \$15 each. His policy was to sell to retailers at a certain list price less 20% after allowing himself a 40% margin on his sales. He also sold to individuals other than retailers at his list price.

He sold 20 carts to retailers, 3 to individuals, and donated one as a prize in a golf tournament. What was his profit on the shipment?

### MARKUP REQUIRED TO PROVIDE A SPECIFIED MARGIN OF PROFIT

7. A sporting goods manufacturer makes fishing rods at a cost of \$5.32 each and sells to make a gross margin of profit of 30% of sales. At what price should he list the fishing rods in his catalogue so that he may allow the retailer discounts of 20% and 5% and still make his margin of profit?

[illegible]

8. At what catalogue price must a manufacturer list his product, which costs him \$3.60, so that he can give trade discounts of 25% and 20% and still make a gross margin of profit on sales of 25%

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

9. A retailer ordered goods listed at \$60, less discounts of 10% and 10%, and paid freight charges of \$1.40 on the order. At what price should he mark the goods so that he can make a gross margin of profit of  $33\frac{1}{3}\%$  on his sales?

[illegible]

# MARKUP REQUIRED TO PROVIDE A SPECIFIED MARGIN OF PROFIT

1. Fill in the blank spaces according to the accompanying information. Calculations may be made on a blank page at the back of the book. (C.P. stands for Cost Price; S.P., for Selling Price.)

No.	MANUFACTURER'S COST	MANUFACTURER'S PROFIT	MANUFACTURER'S NET SELLING PRICE	TRADE DISCOUNT TO RETAILER	LIST PRICE
1	\$13.50	20% on C. P.	\$	10% and 10%	\$
2		20% on S. P.		20% and 10%	10.00
3	6.12	..% on S. P.	9.18	15% and 10%	
4		25% on C. P.	32.00	20% and 20%	
5	10.00	..% on S. P.	15.00		25.00
6		25% on C. P.	15.75	12½% and 10%	
7		20% on S. P.		33⅓% and 10%	14.00
8	12.00	..% on C. P.	13.50	25% and ..%	20.00
9	36.20	20% on S. P.		10% and 5%	
10	8.36	..% on C. P.	12.54	20% and 5%	

2. Fill in the blank spaces according to the accompanying information.

No.	LIST PRICE	TRADE DISCOUNT	RETAILER'S COST	RETAILER'S PROFIT	RETAILER'S S. P.
1	\$ 7.50	20% and 16⅓%	\$	50% on C. P.	\$
2	8.00	25% and 20%		33⅓% on S. P.	
3	14.50	10% and 10%		....% on C. P.	13.50
4	55.00		33.00	....% on S. P.	49.50
5		15% and 10%	15.30	20% on C. P.	
6		20% and 5%		25% on C. P.	47.50
7	20.00	12½% and 10%		....% on S. P.	21.00
8	10.00	15% and ....%	7.65	15% on S. P.	
9	19.80	33⅓% and 10%		25% on C. P.	
10	18.00	10%, 10% and 5%		30% on S. P.	



# GENERAL PRACTICE IN FUNDAMENTAL OPERATIONS

1. Add vertically and horizontally, and find the proving total.

No.	1				2				3				4				5				6				TOTALS									
1	4	8	9	2	5	6	2	8	7	3	9	2	7	4	6	7	5	2	7	7	6	9	5	3	5	4	9	8	7	5				
2	1	8	3	1	9	7	4	6	3	4	4	5	2	8	1	9	2	6	3	5	4	8	1	7	2	3	7	9	5	2				
3	5	9	4	2	3	3	8	6	3	5	5	3	2	9	5	3	8	2	6	3	1	7	5	3	8	8	2	1	7	5				
4	1	4	6	3	8	1	9	5	8	4	1	6	3	3	9	2	4	7	6	5	9	2	3	8	2	2	6	9	3	7				
5	9	8	4	7	2	9	1	6	2	6	9	4	7	6	1	6	3	2	4	9	4	9	3	7	7	8	3	5	6	3				
6	7	2	1	8	5	7	4	8	6	3	7	8	9	1	2	7	6	4	3	5	7	1	2	3	4	7	6	4	1	7				
7	5	6	3	9	3	4	9	6	3	8	8	6	4	9	7	8	6	3	3	4	8	5	5	4	3	8	1	4	7	6				
8	1	6	9	7	4	1	5	4	8	7	1	4	9	6	8	1	3	2	9	8	1	6	7	5	4	1	4	8	7	5				
9	2	6	3	4	8	2	6	7	1	3	2	5	9	8	6	2	4	3	7	5	2	3	8	6	9	2	6	7	3	1				
10	3	8	5	6	8	3	4	2	7	5	3	5	9	4	9	3	6	5	5	6	3	9	8	7	4	3	4	3	5	6				
11	4	9	9	3	8	4	6	7	5	4	4	8	5	3	2	4	7	6	8	9	4	3	2	1	9	4	9	8	7	6				
12	5	6	7	8	9	5	4	3	2	1	5	6	3	5	4	5	8	6	3	9	5	4	2	7	6	5	9	4	6	3				
13	6	8	3	9	7	6	2	7	4	2	6	7	8	9	1	6	8	9	1	3	6	1	3	5	7	6	3	5	7	9				
Tot.																																		

2. Find the values in per cent of each amount as required by the percentages at the head of each column, and find the proving total.

No.	AMOUNT					5%			15%			20%			25%			35%			PER CENT TOTALS		
1	7	2	5	2	0																		
2	6	3	4	5	0																		
3	8	4	6	0	0																		
4	9	3	8	4	0																		
5	2	6	3	5	0																		
6	5	3	8	1	0																		
7	2	3	6	3	0																		
8	7	5	0	0	0																		
9	1	2	5	5	0																		
10	8	5	0	0	0																		
Tot.																							

# UNIT 4

## SIMPLE INTEREST

### REVIEW OF OPERATIONS WITH FRACTIONS

1. Simplify the following expressions.

(1) $256.25 \times .05\frac{1}{2} \times \frac{292}{365}$	(2) $\frac{147.20}{1\frac{1}{2}\% \times \frac{148}{365}}$
(3) $\frac{3.25}{125 \times \frac{73}{365}}$	(4) $\frac{14.25}{140.75 \times 2\frac{1}{4}}$
(5) $\frac{49.70}{1625\frac{1}{2} \times .05\frac{1}{2}}$	(6) $\frac{16\frac{4}{5}}{840\frac{3}{4} \times 2\frac{3}{4}\%}$
(7) $\frac{156.25}{1 + 5\% \times 2.5}$	(8) $\frac{87.50}{1 + \frac{3\frac{1}{2}}{100} \times \frac{63}{365}}$

## BASIC INTEREST CALCULATIONS

Simple interest problems arise in connection with the lending of money. The factors used in the calculation of interest are:

- (1) **PRINCIPAL** — The sum of money lent or used.
- (2) **INTEREST** — The charge for the use of money lent.
- (3) **TIME** — The length of time for which the money is loaned or used.
- (4) **RATE** — A per cent value of the loan, calculated on an annual basis.
- (5) **AMOUNT** — The sum of the principal and interest.

### The Simple Interest Formula

The simple interest formula is  $I = PRT$  (Interest = Principal  $\times$  Rate  $\times$  Time).

The following equations are derived from the simple interest formula:

$$(1) I = PRT; (2) P = \frac{I}{RT}; (3) R = \frac{I}{PT}; (4) T = \frac{I}{PR}.$$

The following examples illustrate the use of the simple interest formula.

- (1) Find the interest on \$250 for 3 years at 5%.

$$I = PRT; \text{ therefore, } I = \$250 \times .05 \times 3 = \$37.50.$$

Observe that:

(a) The *rate* may be expressed as a decimal (.05) or as a fraction ( $\frac{5}{100}$ ); either method gives the same result. Use the method which is easier in the case in question.

(b) *Time* must be expressed in years. For example, 7 months is  $\frac{7}{12}$  years, and 30 days becomes  $\frac{30}{365}$  years.

(c) When the interest period is stated as from one date to another, the days are counted, the beginning day being omitted. Thus, the period November 1 to December 31 is 60 days (November, 29 days; December, 31 days).

- (2) What principal will earn \$37.50 interest in 3 years at 5%?

$$P = \frac{I}{RT}; \text{ therefore, } P = \frac{37.50}{.05 \times 3} = \frac{37.50}{.15} = \$250.$$

- (3) At what rate will \$250 earn \$37.50 interest in 3 years?

$$R = \frac{I}{PT} = \frac{37.50}{250 \times 3} = \frac{37.50}{750} = .05 \text{ or } 5\%.$$

- (4) In what time will \$250 earn \$37.50 interest at 5%?

$$T = \frac{I}{PR} = \frac{37.50}{250 \times .05} = \frac{37.50}{12.50} = 3 \text{ years.}$$

- (5) What principal will amount to \$287.50 in 3 years at 5%?

Because the interest is not known, the formula used in (2) cannot be employed in this problem. The appropriate formula is derived as follows:

$$P + I = A. \text{ But } I = PRT, P + PRT = A; \text{ hence } P(1 + RT) = A; \text{ hence } P = \frac{A}{1 + RT}.$$

Applying the formula to this problem, we have:

$$P = \frac{287.50}{1 + .05 \times 3} = \frac{287.50}{1 + .15} = \frac{287.50}{1.15} = \$250.$$

# BASIC INTEREST CALCULATIONS

1. Using the appropriate formula, show solutions for the following. The space to the right is for your calculations.

<p>(1) Find the interest on \$325 at <math>3\frac{1}{2}\%</math> for 8 years.</p> <p>.....</p> <p>.....</p> <p>.....</p>	
<p>(2) Find the interest on \$150 at <math>5\%</math> for 9 months.</p> <p>.....</p> <p>.....</p> <p>.....</p>	
<p>(3) Find the interest on \$240 at <math>6\%</math> from October 1 to December 13 of the same year.</p> <p>.....</p> <p>.....</p> <p>.....</p>	
<p>(4) What principal will earn \$1.40 interest in 30 days at <math>6\%</math>?</p> <p>.....</p> <p>.....</p> <p>.....</p>	
<p>(5) At what rate will \$400 earn \$4.80 interest in 73 days?</p> <p>.....</p> <p>.....</p> <p>.....</p>	
<p>(6) In what time will \$600 earn \$9 interest at <math>6\%</math>?</p> <p>.....</p> <p>.....</p> <p>.....</p>	



# BASIC INTEREST CALCULATIONS

(7) What principal will amount to \$336.50 at 5% in 9 months?

(8) A man wishes to pay a debt of \$500 eight months before it is due. If money is worth 6%, how much should the creditor be willing to accept in full settlement of the debt?

(9) Fill in the blank spaces according to the information given.

No.	PRINCIPAL	RATE	TIME	INTEREST	AMOUNT
1	\$960.00	1½%	July 18 to September 26	\$	\$
2	450.00	6%		16.25	
3	300.00		October 1 to December 1	3.00	
4		3%	October 1 to December 13	7.40	
5		5%	4½ years		785.00
6		4%	186 days	4.46	
7		6%	June 5 to November 30		150.00
8	820.00	2%	October 1 to	3.28	
9	600.00		90 days	7.50	
10	910.00	4%	May 20 to July 20		
11		4½%	2 years, 9 months		785.00
12		6%	March 1 to September 1	19.00	
13	545.00	5½%	September 1 to	20.00	
14	250.00		2½ years		268.75
15		3%	292 days		1075.00
16		3½%	146 days		496.00

## ACCRUED INTEREST ON BONDS

A bond yields interest at a specified rate, payable on specified dates, usually annually or semi-annually. When bonds are purchased at the time of issue, there is no problem of accrued interest. However, once bonds are issued, they become marketable commodities and are bought and sold readily at banks, stock-brokers or in transactions between individuals. If a bond is purchased between interest dates, the purchaser should pay the interest accrued since the last interest date in addition to the price of the bond.

**EXAMPLE 1**—Find the cost of a \$500 Dominion of Canada 3% bond, offered at par on September 11. Interest coupons are dated June 30 and December 31.

The accrued interest on this bond is from June 30 to September 11, or 73 days.

Interest =  $PRT = \$500 \times .03 \times 73/365 = \$3.00$ .

Total purchase price =  $\$500.00 + \$3.00 = \$503.00$ .

**EXAMPLE 2**—Find the total cost of the bond in Example 1 if the market price of the bond is \$95.

Price of the bond =  $5 \times \$95 = \$475.00$ .

(Note that market price is  
quoted per \$100.)

Accrued interest (see above) =  $\frac{3.00}{\$478.00}$ .

Total cost

1. On July 28, A bought at his bank a \$500 Dominion of Canada 3% bond, on which interest coupons are payable May 31 and November 30. The market price at the time of purchase was 95 $\frac{3}{4}$ . What was the total cost?

2. On November 20, B sold at his bank a \$1,000 Dominion of Canada 2 $\frac{3}{4}$ % bond quoted at 96 $\frac{1}{2}$ . B had clipped all due coupons, the last one being dated September 30. What were the proceeds of the sale?

3. Find the amount paid for each bond listed in the following table.

No.	FACE VALUE	INTEREST RATE	DATES WHEN INTEREST IS PAYABLE	DATE PURCHASED	MARKET PRICE	COST	
1	\$ 100	3%	June 30, December 31	Sept. 1	\$ 98.50		
2	500	2 $\frac{3}{4}$ %	March 31, September 30	Apr. 30	Par		
3	1,000	4 $\frac{1}{2}$ %	May 1, November 1	Oct. 1	105.00		
4	500	3%	March 1, September 1	June 30	99.75		

## PARTIAL PAYMENT ON DEMAND NOTES

When money is borrowed in the course of a business transaction, it is customary to give the lender a *promissory note* covering the loan. Sometimes, the money is loaned on the condition that the lender may demand payment at any time, or it may be that the lender agrees that the borrower may make *partial payments* on the note from time to time, no specified date being set for the final payment. Banks will lend on this plan to customers who have pledged adequate security and whose credit rating is good. The form of promissory note suitable for this type of transaction is known as the *Demand Note*. (Days of grace do not apply to notes payable on demand.)

The following example illustrates the calculation of interest on a demand note during the course of its payment.

John Doe borrowed \$500 from his bank, giving the demand note illustrated here.

\$500.00

Ourtown, Ont., November 5, 1958.

On demand I promise to pay to the order of

### THE BANK OF OURTOWN

the sum of Five hundred.....00/100 Dollars

with interest at the rate of 6% per annum until paid. Value received.

*John Doe*

The following payments were made on the above note:

December 10/58	\$ 50.00
April 10/59	\$ 5.00
June 22/59	\$100.00

Find the total amount owing on November 15/59.

Principal owing November 5/58	= \$500.00
Interest on \$500 from Nov. 5/58 to Dec. 10/58	= 2.88
Amount owing Dec. 10/58	= 502.88
Payment Dec. 10/58	= 50.00
Reduced principal as of Dec. 10/58	= 452.88
Interest on \$452.88 from Dec. 10/58 to Apr. 10/59	= 9.01

Payment of \$5.00 on Apr. 10/59, not being sufficient to cover the accrued interest, is not applied at this time.

Interest on \$452.88 from Apr. 10/59 to June 22/59	= 5.43
Amount owing June 22/59	= 467.32
Payment applied June 22/59 (\$5.00 plus \$100.00)	= 105.00
Reduced principal June 22/59	= 362.32
Interest on \$362.32 from June 22/59 to Nov. 15/59	= 8.70
Amount owing Nov. 15/59	= <u>371.02</u>

## PARTIAL PAYMENT ON DEMAND NOTES

1. On June 2/58, E. S. Mony borrowed \$2,000 from O. Lendem, giving a demand note bearing interest at  $5\frac{1}{2}\%$  per annum. The following payments were made on the note: Oct 10/58, \$250.00; Dec. 15/58, \$10.00; Jan. 15/59, \$100.00. How much would settle the note on March 3/59?

2. On January 2, A borrowed \$500 from B, giving B a demand note bearing interest at 5% per annum. Payments were made as follows: On June 30, \$10.00; on Sept. 30, \$10.00; on December 31, \$20.00. How much was owing after the last payment?



## PARTIAL PAYMENT ON DEMAND NOTES

3. On March 5, Smith borrowed \$1,000 on his demand note bearing interest at 6% per annum. Smith made the following payments: May 12, \$200; June 30, \$300; August 15, \$400. What amount will settle the note on September 30 of the same year?

[illegible]

4. On June 2, M. Dettor borrowed \$1,500 on his demand note bearing interest at  $5\frac{1}{2}\%$  per annum. Payments were made as follows: September 2, \$10; October 2, \$875; November 2, \$200. How much will be required to settle the note on December 31 of the same year?

[illegible]

## BANK DISCOUNT

The previous assignment deals with business practices and the calculation of interest in connection with promissory notes payable on demand. The present assignment is concerned with the procedure followed and the calculation of interest when borrowing on promissory notes having a specified date of payment.

When money is borrowed from a bank on a promissory note having a *specified date of payment*, the bank gives the borrower the face value of the note *less* the interest on it for the period of the loan. This is known as *discounting* the note, and the interest deducted is known as *bank discount*. By law, the actual date of payment is extended three days, called *days of grace*, beyond the specified date. As noted in the previous assignment, days of grace are not allowed on demand notes.

A bank will discount the borrower's personal note and also those which he holds from his debtors. In either case, the note may be non-interest bearing or interest bearing.

### Discounting a Non-interest Bearing Personal Note

EXAMPLE—On December 1, 19--, John Doe borrowed from his bank on his personal note. The bank discounted the note on the date of issue at 6%, the proceeds being deposited in John Doe's bank account. Find the bank discount and the proceeds.

\$500.00	Hamilton, Ontario, October 1, 19—
One month after date I promise to pay to the order of	
<b>THE HAMILTON BANK</b>	
Five hundred.....00/100 Dollars	
Value received.	
<i>John Doe</i>	

The bank discount is the interest on \$500 at 6% for 34 days (Oct. 1 to Nov. 1, plus three days of grace).

Therefore, the bank discount =  $PRT = \$500 \times .06 \times 34/365 = \$2.79$ .

Proceeds deposited =  $\$500.00 - \$2.79 = \$497.21$ .

Observe that the borrower pays interest on \$500 although he receives only \$497.21. Therefore, the bank discount rate is different from the true interest rate.

1. According to the data given, find the bank discount at 6% and the proceeds of the following promissory notes. The notes are discounted on the date of issue.

No.	FACE VALUE OF THE NOTE	DATE OF ISSUE	TIME ON THE NOTE	BANK DISCOUNT	PROCEEDS
1	\$ 600	Sept. 1	3 months		
2	1,000	Oct. 20	60 days		
3	550	Oct. 10	30 days		
4	1,200	Sept. 15	90 days		

## BANK DISCOUNT

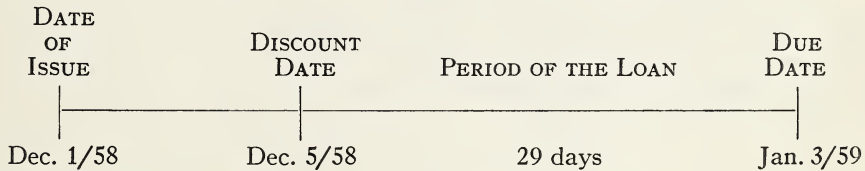
### Discounting Non-interest Bearing Notes Received from Debtors

When a business man receives a promissory note from his customer, it is not necessary for him to hold the note until its due date. Banks readily discount such notes for their clients of good credit standing and collect from the payer of the note when it becomes due.

EXAMPLE—John Doe, a merchant, accepted from his customer the promissory note illustrated here. On December 5, Doe discounted the note at his bank at 6%, depositing the proceeds. Find the proceeds.

\$250.00	Winnipeg, Manitoba, December 1, 1958
Thirty days after date I promise to pay to the order of	
.....John Doe.....	
Two hundred and fifty.....00/100 Dollars	
Value received.	
<i>B. Owen</i>	

In discounting the note, the bank is really lending John Doe the proceeds of the note for the period, Dec. 5/58 to Jan 3/59, when the bank will collect \$250 from the payer of the note, B. Owen.



$$\text{Discount} = \text{PRT} = \$250 \times .06 \times 29/365 = \$1.19.$$

$$\text{Proceeds} = \$250.00 - \$1.19 = \$248.81.$$

1. On November 8, a merchant discounted at his bank at 6% a promissory note received from a customer. The note was for \$450, dated Oct. 28, and was to run for 30 days. Find the proceeds.

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2. According to the data given in the table below, find the proceeds of each note discounted at 6%.

No.	FACE VALUE OF THE NOTE	DATE OF NOTE	TIME TO RUN	DATE DISCOUNTED	PROCEEDS
1	\$375	Mar. 13	30 days	Mar. 18	
2	950	May 10	90 days	June 1	

## BANK DISCOUNT

### Discounting Interest-Bearing Notes

Occasionally, a business man will accept from a customer an interest-bearing note. Such notes, as well as non-interest bearing notes, may be discounted at a bank.

**EXAMPLE**—The promissory note illustrated here was received on November 10 and discounted the same day at the bank, the discount rate being 6%. Find the proceeds.

\$250.00	Halifax, Nova Scotia, November 1, 19—
Thirty days after date I promise to pay to the order of	
..... John Doe.....	
Two hundred and fifty.....00/100 Dollars	
with interest at the rate of 5% per annum both before and after maturity until paid. Value received.	
<i>B. Owen</i>	

On the due date, the bank will collect \$250 *plus interest*, and it is this *maturity value* which the bank discounts. The first thing to determine, therefore, is the maturity value of the note.

The note bears interest at 5% from Nov. 1 to Dec. 4 or 33 days.

Interest =  $PRT = \$250 \times .05 \times 33/365 = \$1.13$ .

The maturity value of the note is  $\$250.00 + \$1.13$  or  $\$251.13$ .

The discount period, Nov. 10 to Dec. 4 is 24 days.

Bank discount =  $\$251.13 \times .06 \times 24/365 = 99 \text{ cents}$ .

Proceeds =  $\$251.13 - \$ .99 = \$250.14$ .

1. A \$500 promissory note, bearing interest at  $5\frac{1}{2}\%$ , dated October 15, payable 2 months after date, was discounted on October 31 at 6%. Find the proceeds.

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2. According to the information given in the table below, find the proceeds.

No.	FACE VALUE OF NOTE	INT. RATE	DATE OF NOTE	TIME TO RUN	DATE DISCOUNTED	DISCOUNT RATE	PROCEEDS	
1	\$450	5%	June 1	3 months	June 5	6%		
2	650	6%	Sept. 1	60 days	Sept. 10	6%		
3	375	$4\frac{1}{2}\%$	Oct. 1	30 days	Oct. 1	6%		



## BANK DISCOUNT

1. Smith arranged with his banker for a \$500 loan for two months beginning May 1. The bank discounted Smith's \$500 promissory note of that date at  $5\frac{1}{2}\%$ . Find the proceeds.

2. A merchant accepted from one of his customers a \$225 promissory note dated April 4, to run for 60 days. On April 10, he discounted the note at the bank at 6%. Find the proceeds.

3. Find the proceeds from discounting a 90-day promissory note for \$125, dated March 15 and bearing interest at 6%. The discount date was March 31 and the discount rate, 6%.

4. A gave B a 3-month promissory note for \$150, dated January 5 and bearing interest at 6%. Find the proceeds of this note discounted at  $5\frac{1}{2}\%$  on the same day as issued.

## BANK DISCOUNT

### Discounting Drafts Drawn on Customers

If he so desires, a business man of good credit rating may draw drafts on his customers to whom he has made sales and by discounting the drafts provide himself with ready funds, which otherwise would not be received until payments on the invoices were due.

EXAMPLE—The following invoice represents a sale made by Adams & Holt.

<b>ADAMS &amp; HOLT</b>	
Sudbury, Ontario	
Sold to: Henry Bews, Ltd., Toronto, Ont.	Date: November 1/59 Our No.: 427 Via: CNR Terms: 2/30, N/60
2000 reams Fine Bond #20 @ .55	\$1,100.00
2400 reams Fine Bond #24 @ .55	1,320.00
Packing charges	5.00
	<u>\$2,425.00</u>

On Nov. 10/59, needing funds, Adams & Holt drew the following draft on Henry Bews, Ltd. Note that Adams & Holt have assumed that Henry Bews, Ltd. will want to take advantage of the cash discount allowed by the terms of the sale, and have therefore made the terms of the draft coincide with the terms of the invoice with respect to the amount and time of payment.

\$2,376.50	Vancouver, B.C., November 1/59
Thirty days after date pay to the order of	
<b>ADAMS &amp; HOLT</b>	
Two thousand three hundred and seventy-six.....50/100 Dollars	
Value received and charge to the account of	
To: Henry Bews, Ltd. Toronto, Ont.	Adams & Holt per G. Adams

Adams & Holt discounted the above draft at their bank at 6% on November 10/59, (the same day on which they drew the draft, and deposited the proceeds. Find the proceeds.

The due date of the draft is December 4/59.

The discount period is 24 days (Nov. 10/59 to Dec. 4/59.)

The bank discount =  $PRT = \$2,376.50 \times .06 \times 24/365 = \$9.38$ .

The proceeds deposited =  $\$2,376.50 - \$9.38 = \$2,367.12$ .

The Vancouver bank will forward the draft to its agent in Toronto, with instructions to have the draft formally accepted and to collect payment when due.

# BANK DISCOUNT

1. Adams & Holt mailed an invoice, dated Dec. 1 to R. Bell for goods shipped to the value of \$850; terms, 2/10, N/30. On the same day (Dec. 1), Adams & Holt drew a 10-day draft on R. Bell for the amount of the invoice according to its terms and discounted it at the bank immediately at 6%. Find the proceeds of the draft.

2. Assume that R. Bell does not pay the draft described in Problem 1 when due. Instead, he asks Adams & Holt to draw on him at 30 days from Dec. 1 for \$850. Adams & Holt agree, draw the draft and discount it at the bank at 6% on December 13. Find the proceeds.

3. Find the proceeds of the following drafts according to the data given. An interest-bearing draft is discounted in the same way as an interest-bearing note.

No.	FACE OF DRAFT	DATE OF DRAFT	TIME	INTEREST RATE	DATE OF DISCOUNT	DISCOUNT RATE	PROCEEDS	
1	\$ 710.50	Jan. 4/59	30 days		Feb. 1/59	6%		
2	3,158.50	Dec. 8/58	60 days		Feb. 1/59	6%		
3	162.90	Dec.13/58	90 days	5%	Feb. 16/59	6%		
4	75.30	Jan. 15/59	1 month	4%	Jan. 15/59	5%		
5	807.52	Jan. 29/59	30 days		Feb. 5/59	6%		
6	1,526.00	Mar. 10/58	60 days		Mar. 15/58	6%		
7	240.00	Nov. 30/58	1 month	6%	Dec. 5/58	5%		
8	346.75	Dec.18/58	90 days	5%	Dec. 20/58	6%		
9	300.00	Dec. 1/58	60 days	6%	Dec. 10/58	6%		
10	600.00	Dec. 5/58	2 months	5%	Jan. 7/59	6%		

## INSTALMENT BUYING

When goods are purchased on the instalment plan, it is customary for the seller to add a carrying charge to the cash price. This carrying charge is really an interest charge on the debt.

### Calculating the Carrying Charge or Credit Rate

The rate may be found by using the simple interest formula,  $R = \frac{I}{PT}$ .

I (Interest) is the difference between the credit plan price and the cash price; that is, the carrying charge.

P (Principal) is the *average* amount owed per month on the debt (*not including the carrying charge*).

T (Time) is the period (in years) over which the debt is paid.

EXAMPLE—An article can be purchased for \$100 cash, or under a credit plan by paying \$10 at the time of purchase and 10 monthly payments of \$10 each. Find the credit (interest) rate per annum.

I = The credit plan price (\$110) *less* the cash price (\$100) = \$10.

P = The average of \$90 (the debt less the carrying charges owing at the time of the first monthly payment *plus* \$9 (the last monthly instalment *less* the carrying charges) =  $\frac{\$90 + \$9}{2} = \$49.50$ .

T = 10 months =  $10/12$  years.

Using the formula  $R = \frac{I}{PT}$ ,  $R = \frac{\$10}{\$49.50 \times 10/12} = .2424$  or 24% (approx.).

The \$90 is derived as follows: Eliminate the carrying charges and the down payment from the credit plan price; the remainder is the *net debt* remaining on the article purchased. (\$110 less \$10 carrying charges and \$10 down payment = \$90.)

For instance, if the purchaser could find \$90 to add to his down payment at the time of purchase, there would be no further debt and no carrying charges.

1. A piece of furniture can be bought for \$50 cash or, on the instalment plan, by paying \$5.00 down at the time of purchase and the balance in 11 monthly instalments of \$4.50. What is the credit charge rate?



# INSTALMENT BUYING

2. A bedroom suite may be purchased for \$150 cash or on a credit plan by paying \$30 down and the balance, including \$7.80 carrying charges, in 12 equal monthly instalments. What is the credit charge rate?

3. A finance company loaned \$240 to a client on the security of a chattel mortgage. The loan was to be paid back in 12 monthly instalments of \$22.60 each. What annual rate is being charged on the loan?

4. A borrowed \$15 from B, agreeing to pay off the loan by payments of \$2.00 a week for 12 weeks. What interest rate is being charged?

5. Find the interest rate for each of these credit plans.

No.	CASH PRICE	CREDIT PLAN PRICE	DOWN PAYMENT	MONTHLY PAYMENT	TIME TO PAY	INTEREST RATE
1	\$ 99.50	\$109.45	\$ 9.45	\$10.00	10 months	
2	27.50	35.00	none	5.00	7 months	
3	30.00	33.00	7.00	2.00 (wk.)	13 weeks	
4	120.00	129.00	39.00	9.00	10 months	
5	550.00	650.00	50.00	50.00	12 months	

# GENERAL PRACTICE IN FUNDAMENTAL OPERATIONS

1. Add vertically and horizontally and find the proving total.

No.	(1)	(2)	(3)	(4)	(5)	(6)	TOTALS
1	4 1 9 3 8	6 9 4 7 7	7 2 8 1 1	9 1 7 6 2	1 2 3 4 5	4 2 8 9 1	
2	9 7 3 6 4	8 3 6 3 2	7 1 2 9 9	7 6 4 1 7	2 3 4 5 6	1 3 6 4 2	
3	5 8 6 3 5	1 7 9 6 4	6 3 2 7 5	1 6 2 1 9	3 4 5 6 7	7 8 6 3 4	
4	6 5 6 8 6	7 3 5 4 1	5 3 3 2 5	9 1 9 3 3	4 5 6 7 8	6 5 2 7 5	
5	7 3 7 4 4	8 7 6 5 4	5 6 6 3 5	7 6 2 4 6	5 6 7 8 9	9 8 2 3 6	
6	9 9 8 3 2	4 5 6 7 8	6 8 9 7 4	4 6 2 7 9	6 7 7 3 5	3 2 8 6 3	
7	4 3 1 7 7	7 7 6 3 9	4 9 6 3 2	3 9 1 4 3	5 8 3 1 1	2 8 3 7 5	
8	1 6 9 2 8	3 6 2 4 3	7 1 9 3 3	6 4 1 7 5	7 2 8 6 9	1 6 4 3 5	
9	3 4 7 3 6	2 6 4 6 3	7 2 9 3 8	7 2 6 4 6	4 1 9 3 4	4 2 8 7 3	
10	5 4 9 3 1	6 3 2 3 2	5 2 6 3 7	8 2 8 3 6	1 9 2 8 8	5 9 7 8 6	
11	4 6 2 7 3	7 6 2 1 9	6 3 5 3 5	9 2 5 4 1	6 3 8 4 2	3 7 3 7 3	
12	9 7 6 3 4	8 7 5 3 5	7 6 3 8 7	4 9 7 4 3	1 3 8 6 5	2 9 8 7 5	
Tor.							

2. Add vertically and horizontally and find the proving total.

No.	(1)	(2)	(3)	(4)	(5)	(6)	TOTALS
1	5 6 3 2 1	6 2 1 7 4	7 6 4 3 3	9 8 4 7 1	1 9 6 3 4	6 7 5 3 5	
2	2 7 9 6 3	3 8 7 3 6	3 2 8 5 6	3 2 8 5 6	7 1 3 3 1	1 2 4 7 3	
3	9 6 3 2 8	5 7 6 4 2	7 5 2 7 2	6 2 7 4 7	1 9 8 8 5	3 2 7 4 1	
4	2 7 6 3 8	4 2 4 6 4	4 2 4 6 4	2 2 8 7 5	1 7 1 3 6	8 6 3 3 5	
5	1 9 3 9 3	5 4 8 3 8	5 4 8 3 8	2 6 3 9 8	7 9 1 9 1	5 4 9 8 2	
6	3 6 3 7 9	4 5 3 6 2	7 3 7 8 4	6 3 9 2 8	8 3 6 4 5	9 6 3 7 5	
7	6 9 7 3 8	5 2 5 3 5	6 1 5 1 5	4 7 8 2 6	3 8 4 5 8	3 1 7 6 2	
8	9 8 7 6 9	7 9 6 3 2	6 9 5 7 3	7 1 9 6 4	6 7 5 3 5	9 8 7 6 9	
9	4 6 2 7 3	7 6 2 1 9	6 3 5 3 5	9 2 5 4 1	6 3 8 4 2	8 9 6 7 8	
10	5 3 3 2 5	6 5 6 8 6	5 8 6 6 4	7 2 8 1 1	7 6 4 1 7	7 9 6 3 2	
11	4 2 8 9 1	7 8 6 3 4	1 6 9 3 5	2 9 8 7 5	1 3 8 6 5	5 6 9 3 8	
12	3 4 7 5 6	2 2 9 2 4	4 9 7 4 3	3 8 5 9 2	2 9 1 7 5	8 6 5 1 7	
13	1 9 8 3 8	8 8 2 7 1	6 3 2 1 7	4 6 4 1 8	9 7 3 1 9	7 1 9 6 4	
Tor.							

# UNIT 5

## REAL PROPERTY

### INSURANCE

*Real property* includes buildings and land as distinct from *personal property* such as a radio or an automobile. The arithmetic of this unit is concerned with:

- (a) Insurance on real property
- (b) Municipal taxation on real property
- (c) A reasonable rental charge on real property
- (d) Adjustments to the price when purchasing real property
- (e) Schedule of payments when real property is purchased on a monthly payment plan.

#### Property Insurance

Insurance on real property is ordinarily purchased for a three-year term at a time. The *policy* is the insurance contract and states the amount of insurance (called the *risk*); the *premium* is the amount paid for the term of the policy; the *rate* for property insurance is usually stated at a definite amount per \$100. Incidentally, insurance on personal property follows the same pattern as that for real property.

Only three types of problems are given here:

- (1) Finding the *premium* when the risk and the rate are given.
- (2) Finding the *risk* when the premium and the rate are given.
- (3) Finding the *rate* when the risk and the premium are given.

EXAMPLE 1—Find the premium on a risk of \$12,000 at 75 cents per \$100.

$$\text{Premium} = \text{Risk} \times \text{Rate} = \$12,000 \times \frac{.75}{100} = \$90.$$

EXAMPLE 2—Find the risk which can be purchased for a premium of \$90 when the rate is 75 cents per \$100.

$$\text{Risk} = \text{Premium} \div \text{Rate} = \$90.00 \div \frac{.75}{100} = \$12,000.$$

EXAMPLE 3—Find the rate at which the premium for a risk of \$12,000 will be \$90.

$$\text{Rate} = \text{Premium} \div \text{Risk} = \$90.00 \div \$12,000 = .0075 \text{ or } 75 \text{ cents per } \$100.$$

Using the above formulae, find the risk or rate or premium as required.

No.	RISK	RATE PER \$100	PREMIUM	No.	RISK	RATE PER \$100	PREMIUM
1	\$20,500	\$1.25		8	\$ 6,600		\$ 52.80
2	5,760		\$37.44	9		\$1.10	66.00
3		\$0.75	78.75	10	10,000		65.00
4	2,800	\$0.80		11	12,500	\$1.05	
5	4,500		38.25	12		\$1.20	187.50
6		\$0.95	52.25	13	98,500		1,280.50
7	6,750	\$0.78		14	11,500	\$1.45	

## INSURANCE

### Co-insurance Policies

Under a co-insurance policy, if the owner fails to keep his property insured up to a specified per cent (usually 80%) of the appraised value of the property, the insurance company will pay such a part of the loss sustained as the value of the policy is of the specified per cent of the value of the property.

Co-insurance policies are usually given at a lower rate than ordinary policies. The following example illustrates the method of calculating the amount to be recovered from the insurance company in case of loss.

**EXAMPLE**—A building having an appraised value of \$100,000 is insured for \$60,000 under a policy containing an 80% co-insurance clause. Fire caused a loss of \$50,000 to the building. How much would be recovered from the insurance company?

Property value	= \$100,000.
80% of the property value	= \$ 80,000.
Amount of policy	= \$ 60,000.
Fire loss	= \$ 50,000.

Amount recoverable from the company =  $\frac{60,000}{80,000}$  of \$50,000.  
= \$37,500.

Observe that the company pays *that fraction of the loss which the policy is of 80% of the appraised value of the property*; but, in any case, *not more than the amount of the policy*.

1. A building valued at \$12,000 is insured under a policy containing an 80% co-insurance clause for \$7,500. If damaged to the extent of \$6,000, how much may be recovered from the insurance company?

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2. In each of the following cases, find the amount recoverable from the insurance company.

No.	VALUE OF THE PROPERTY	AMOUNT OF THE POLICY (80% CO-INSURANCE)	LOSS BY FIRE	AMOUNT RECOVERABLE UNDER THE POLICY
1	\$15,000	\$10,000	\$10,800	
2	13,000	9,500	10,400	
3	9,000	6,500	8,500	
4	25,000	18,000	18,600	
5	12,000	7,500	8,400	



## MUNICIPAL TAXATION

Every municipality has an obligation to provide certain public services such as schools, fire and police protection, maintenance of roads, etc. The money to pay for these services is raised largely by a tax on real property. For taxation purposes, an *assessment* is placed on each piece of real property within the boundaries of the municipality. The assessment is related to the actual value of the property but may be neither the original value of the property nor its current value.

Knowing the total assessment, the municipal council sets or strikes a rate per dollar of the total assessment which will raise the money required from that source, and each owner is then assessed for taxes according to the assessment on his property and the rate which has been set.

The following examples illustrate the three basic types of problems relating to municipal taxation.

**EXAMPLE 1**—What amount of taxes could be raised on a total assessment of \$60,000,000 at a rate of 40 mills per dollar of assessment? (Tax rates are usually expressed in *mills*. A mill is one-tenth of a cent or one-thousandth of a dollar. Thus 40 mills = 4 cents.)

$$\text{Taxes} = \text{Assessment} \times \text{Rate} = \$60,000,000 \times .040 = \$2,400,000.$$

**EXAMPLE 2**—A municipality with a total assessment of \$60,000,000 prepares a budget of estimated expenditures for the year 19— and finds that it will be necessary to obtain \$2,400,000 in taxes from that source. What will be the tax rate?

$$\text{Rate} = \frac{\text{Taxes}}{\text{Assessment}} = \frac{\$2,400,000}{\$60,000,000} = \$0.04 \text{ or } 40 \text{ mills.}$$

**EXAMPLE 3**—What amount of assessment would be required to raise \$2,400,000 taxes at a rate of 40 mills?

$$\text{Assessment} = \frac{\text{Taxes}}{\text{Rate}} = \frac{\$2,400,000}{.04} = \$60,000,000.$$

Local improvement taxes are those charged to the owner of a property for such things as sidewalks, street paving, sewers, or anything which constitutes an improvement of the property. The cost of these improvements is usually charged to the owner on the basis of the foot-frontage of his land, and the total cost is spread over a period of years. The local improvement tax is generally additional to the tax as calculated on the assessment value of the property. In some localities, however, the mill rate is slightly increased to cover the charge for local improvements.

In each of the following, find the taxes, rate or assessment as required.

No.	ASSESSMENT	RATE	TAXES	No.	ASSESSMENT	RATE	TAXES
1	\$360,000	28 mills		5	\$425,000	57 mills	
2	580,000		\$18,875	6		58 mills	\$24,360
3		34.5 mills	12,075	7	228,000		6,954
4	825,000		38,775	8	6,450	46 mills	

## MUNICIPAL TAXATION

1. Find the taxes on a piece of property assessed at \$4,200 when the tax rate is 35 mills.

2. The taxes on a piece of property assessed at two-thirds of its value amount to \$141.60. If the rate of taxation is 29.5 mills, what is the value of the property?

3. If the total assessment of property in a certain city is \$95,840,750, and the estimated budget for the ensuing year amounts to \$5,241,948, what will be the tax rate? If the city council considers adding to the budget another \$100,000, by how much would the tax rate be increased?

4. The total assessment of a certain school section is \$285,000. The cost of operating the school for one year is \$3,025, of which the township provides \$600, and \$1,000 is granted by the provincial government. The school section raises the remainder by a tax on assessed property. What is the mill rate for school purposes?

# MUNICIPAL TAXATION

5. The tax rate for a certain city having a total assessment of \$160,000,000 was broken down as shown below. Find the amount of taxes to be raised for each purpose and find the total mill rate and the total taxes.

	RATE	AMOUNT OF TAXES
Educational purposes	16.30000 mills	\$ _____
Interest and sinking fund	4.38059 "	_____
Civic hospital	2.18491 "	_____
General purposes	<u>19.13450 "</u>	_____
Totals	<u>                    </u>	<u>                    </u>

(1) Prove that the total of the amount of taxes as obtained by adding the above amounts is correct.

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(2) How much does a resident whose home is assessed for \$4,500 pay for educational purposes?

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(3) How much money would an additional tax of  $1\frac{1}{2}$  mills raise?

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(4) By how much would the tax rate be increased if an additional \$80,000 were to be raised for general purposes?

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(5) By how much would the increase in (4) affect the total taxes paid by the resident in (2)?

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## RENTAL CHARGES

The rental charge for real property should be sufficient to recover for the owner all his expenses in maintaining the property plus a reasonable return on the money he has invested in the property. It is generally assumed that 6% per annum is a reasonable return on an investment.

EXAMPLE—A man has built a house at a cost of \$12,000. He intends to rent it. What would be a reasonable monthly rental charge, considering the following facts?

- (a) The property is assessed for \$6,000; the tax rate is 45 mills.
- (b) The house is insured for \$10,000 at 75 cents per \$100, payable every 3 years.
- (c) The water rates are paid by the owner; the average is \$16 per year.
- (d) Estimated cost of depreciation and repairs is 2% of the value of the property annually.
- (e) The return on investment required is 6% per annum.

Expenses to be recovered:

Taxes — \$6,000 assessment at 45 mills	\$ 270.00
Insurance — 1/3 of the premium on \$10,000 at 75 cents per \$100	25.00
Water rates for the year	16.00
Repairs and depreciation — 2% of \$12,000 annually	240.00
	<u>551.00</u>
Return on investment — 6% on \$12,000 annually	720.00
Total annual rent required	<u>\$1271.00</u>

Monthly rental required =  $\$1271.00 \div 12 = \$105.92$ , or \$106 (Approx.).

1. A tenant is paying \$75 a month rental for the property he occupies. He thinks this is too high. Considering the following facts, what would be a reasonable rental charge per month?

- (a) The cost of building the house was \$7,500 (including the lot).
- (b) The tax assessment is \$4,000; the rate is 57 mills.
- (c) The house is insured for \$7,500, under a 3-year policy at 75 cents per \$100.
- (d) Annual repairs and depreciation to be estimated at 2% of the value of the property.
- (e) Water rates, paid by the owner, are expected to amount to \$16 annually.
- (f) Money is worth an annual return of 6%.



## RENTAL CHARGES

2. Although an owner does not pay a monthly rental for his property, the cost of occupying his property may be calculated on a monthly basis. Considering the following facts, what rental equivalent per month is it costing me to occupy my property?

- (a) I bought the property at a cost of \$12,500, paying \$7,500 down and giving a mortgage for \$5,000, which requires semi-annual payments on the principal of \$100 each and payment of interest semi-annually on the balance owing at the rate of  $5\frac{1}{2}\%$  per annum.
- (b) For municipal taxes, the property is assessed at \$4,600, the current tax rate being 56 mills.
- (c) The property is insured for \$12,000, the premium being at the rate of 80 cents, payable every three years.
- (d) The water rates are estimated to be \$1.25 a month.
- (e) Annual repairs and depreciation are estimated to be 2% of the value of the property.
- (f) I estimate the return on my investment to be the same as I am paying on the mortgage —  $5\frac{1}{2}\%$ .

Should the semi-annual payments on mortgage principal be considered an expense of occupying the property?

3. From the tabulated data, calculate a reasonable monthly rental for each piece of property. In each case, the landlord is entitled to a 6% return on his investment.

No.	COST OF PROPERTY (INVESTMENT)	ASSESSED VALUE	TAX RATE	INSURANCE COST (PER YEAR)	ANNUAL WATER RATES	REPAIRS AND DEPRECIATION (RATE ON COST)	MONTHLY RENTAL
1	\$ 8,000	\$3,500	58 mills	\$26.50	\$14.00	2% per annum	
2	9,500	6,000	45 "	32.80	16.00	2% " "	
3	14,000	8,400	48 "	45.00	18.00	2% " "	
4	18,500	9,250	52 "	52.00	18.00	2% " "	
5	10,000	5,800	50 "	31.00	15.00	2% " "	

### ADJUSTMENTS TO THE PURCHASE PRICE OF PROPERTY

On the date a piece of real property is sold, it is usual to find that certain charges against the property such as taxes, water rates, insurance premiums, mortgage interest and principal are either paid in advance of the date of sale or are accrued or in arrears. Since all charges against the property should be borne by the seller up to the date of sale but not beyond it, some adjustment to the purchase price may be necessary.

EXAMPLE—A purchases property from B, paying \$1,000 with his offer of purchase. If the total price is \$12,500 and the title is to pass on November 1, 1959, what will be the final cash settlement? The following facts are to be considered:

- (a) 1959 taxes of \$180 have been paid in full.
  - (b) A 3-year insurance policy on the property dating from February 1, 1959, premium \$52, is taken over by A.
  - (c) Water rates are paid quarterly and have been paid up to September 30, 1959. It is estimated that the bill for the current quarter will be \$4.50.
- (a) Taxes are paid in full for 1959; therefore, the seller receives a rebate of  $2/12$  of the taxes paid.  $2/12$  of \$180 = \$30.
- (b) The insurance premium of \$52 was for 36 months. Only 9 months have elapsed; therefore, the seller is entitled to a rebate of  $27/36$  of \$52, or \$39.
- (c) The seller should pay for the use of water for the month of October, or  $1/3$  of the current quarter;  $1/3$  of \$4.50 = \$1.50.

The net adjustment will be rebates to the seller of \$30 and \$39, less a charge of \$1.50, or \$67.50; that is, the buyer will have to pay the seller an additional \$67.50.

The cash settlement will be \$12,500 less the down payment of \$1,000 plus the net adjustment of \$67.50, or \$11,567.50.

1. R purchases property from S for \$8,600, paying \$500 with his offer of purchase, final settlement to be made on October 1, 1959. Considering the following facts, what amount must R pay S as a final cash settlement?

- (a) R is assuming from S a \$4,000, 5% mortgage on the property. The last payment of interest — paid half-yearly — was on June 30, 1959. Interest is not in arrears.
- (b) 70% of the 1959 taxes have been paid. The tax rate is 57 mills on an assessment of \$3,800.
- (c) Water rates have been paid up to September 30, 1959.
- (d) A \$7,500 insurance policy on the property, dating from October 1, 1958, rate, 50 cents per \$100 for three years, is transferred to R.

## ADJUSTMENTS TO THE PURCHASE PRICE OF PROPERTY

2. A man purchased a home for \$9,800, paying \$500 with his offer to purchase, final settlement to be made as of August 1, 1959. What would be the amount of final settlement? The following facts are to be considered:

- (a) The seller accepts a mortgage on the property for \$4,000; the balance is to be paid in cash.
  - (b) No taxes for 1959 have been paid. The rate is 55 mills on an assessment of \$4,600.
  - (c) Water rates for the first two quarters ending June 30, 1959, have been paid. The last quarterly bill was for \$4.00.
  - (d) The insurance policy on the property is to be transferred to the purchaser, the premium being \$48 every three years. The policy dates from November 1, 1957.
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3. Smith purchased a house from Jones for \$7,600, paying \$600 with his offer of purchase, final settlement to be made as of May 25, 1959. The following facts are to be considered in determining the amount of the final settlement:

- (a) Smith is assuming Jones' obligation on a 6%, \$3,800 mortgage. Interest and principal are payable on March 31 and September 30 of each year. There are no arrears on the mortgage.
- (b) 1959 taxes amount to \$202.00. 40% of the taxes for the year have been paid.
- (c) The last quarterly water bill due on March 31, 1959 was paid on that date. The bill was \$3.75.
- (d) Smith is going to insure the property through his own agent.
- (e) Smith is allowing his present tenant of the property to occupy the house until June 30, 1959. The rent, \$55 a month, is to be collected by Jones.

What is the amount of final settlement?

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# MONTHLY PAYMENT PLANS

A house is purchased on July 1, 1959 for \$7,500, under the following terms: A down payment of \$2,500 and payments of not less than \$55 a month are to be made until the balance is fully paid. This monthly payment is to be applied first to the monthly proportion of taxes and insurance — both of which are to be paid by the seller of the property — and to interest at 6% per annum on the balance owing on the contract. The remainder is to be used to reduce the debt on the property.

Assuming that the assessment on the property is \$4,500, the tax rate for 1959 is 57 mills, and that the insurance premium is \$75.60 every three years, complete the following schedule, following the pattern shown for the first two months.

DATE	MONTHLY PAYMENT	TAXES (PER MONTH)	INSURANCE (PER MONTH)	INTEREST FOR MONTH	PAYMENT ON PRINCIPAL	BALANCE OWING
Jul. 1/59						\$5,000.00
Aug. 1/59	\$55.00	\$21.37	\$2.10	\$25.00	\$6.53	4,993.47
Sept. 1/59	55.00	21.38	2.10	24.97	6.55	4,986.92
Oct. 1/59						
Nov. 1/59						
Dec. 1/59						

To provide practice in this exercise, continue the above schedule for 1960 for the months indicated below, but change the monthly payments to \$65 per month and the tax rate to 58 mills; the insurance and interest rates on the debt remain unchanged.

Jan. 1/60						
Feb. 1/60						
Mar. 1/60						
Apr. 1/60						
May 1/60						
Jun. 1/60						
Jul. 1/60						
Aug. 1/60						
Sept. 1/60						
Oct. 1/60						
Nov. 1/60						
Dec. 1/60						



# GENERAL PRACTICE IN FUNDAMENTAL OPERATIONS

1. Complete the following table and total the columns.

No.	ASSESSMENT	TAXES ACCORDING TO THESE TAX-RATES										TOTAL TAXES	
		21 MILLS		35 MILLS		42 MILLS		48 MILLS		55 MILLS			
1	\$ 8,550												
2	5,280												
3	2,540												
4	10,560												
5	4,220												
6	5,500												
7	6,275												
8	6,525												
9	7,380												
10	3,870												
TOTALS													

2. Complete the following table and total the columns.

No.	INSURANCE POLICY	PREMIUM RATES PER \$100										TOTAL PREMIUMS	
		80 CENTS		75 CENTS		70 CENTS		65 CENTS		90 CENTS			
1	\$ 4,500												
2	12,500												
3	7,550												
4	18,650												
5	11,800												
6	9,750												
7	15,000												
8	25,500												
9	8,400												
10	14,000												

## UNIT 6

### PAYROLL

#### PAYROLL CALCULATIONS

Preparation of the payroll requires the following calculations:

- The gross earnings according to the rate of pay and the time worked.
- The deductions from gross pay according to statute law and agreement with the employee.
- The net amount of pay, popularly known as "take-home-pay."

**GROSS EARNINGS:** When employees are paid at an hourly rate, it is customary to keep *time cards* similar to those used in this unit. The calculations of pay at regular rates and overtime rates require careful checking.

**DEDUCTIONS:** The statutory deductions which must be considered are (a) income tax (b) unemployment insurance (c) vacation pay.

**INCOME TAX:** The deduction for income tax is ascertained by reference to a table of income tax deductions provided by the Government. The amount of tax is determined according to gross earnings, and the personal exemptions to which the employee is entitled as listed on the TD1 Form which the employee has filed with the employer. If no TD1 has been filed, deductions are made as if the employee were single with no dependents.

**UNEMPLOYMENT INSURANCE:** Not all employees are insurable; that is, subject to deductions for unemployment insurance. A handy source of information on this point is a booklet entitled *Information for Employers on Employment Insurance* issued by the Unemployment Insurance Commission at Ottawa. Rates of deduction and regulations have been changed from time to time, and the student should be furnished with the current rates in effect. Incidentally, the employer contributes an equal amount with the employee.

Unemployment insurance contributions are recorded by affixing unemployment insurance stamps or meter impressions in the employee's unemployment insurance book. Employers with large payrolls may be authorized to pay contributions in bulk by cheque. Unemployment insurance stamps are available at most post offices.

Table of Unemployment Insurance Contributions (WAGES PAID WEEKLY)

EARNINGS PER WEEK	FROM EMPLOYEE'S PAY	EMPLOYER'S CONTRIBUTION	STAMP AFFIXED
Less than \$ 9.00	\$0.18	\$0.18	\$0.36
\$ 9.00 to \$14.99	\$0.24	\$0.24	\$0.48
\$15.00 to \$20.99	\$0.30	\$0.30	\$0.60
\$21.00 to \$26.99	\$0.36	\$0.36	\$0.72
\$27.00 to \$33.99	\$0.42	\$0.42	\$0.84
\$34.00 to \$47.99	\$0.48	\$0.48	\$0.96
\$48.00 and over	\$0.54	\$0.54	\$1.08

**VACATION PAY:** Again a considerable number of rules exist with which the payroll clerk should make himself familiar. The Department of Labour of Ontario issues a leaflet entitled *General Information for Employers and Employees on Vacations With Pay*, which answers several questions on this subject.

Employees in the construction industry must be given vacation pay credit in the form of vacation-with-pay credit stamps. These stamps are affixed in a vacation pay stamp book upon termination of employment or June 30 should the employment extend beyond this date. The amount is a *minimum* of 2% of the earnings received during the preceding period of employment. Employers in other than the construction industry may dispense with the purchase of stamps for his regular employees and merely pay the employee in cash for the vacation period.

**OTHER DEDUCTIONS:** Other deductions are a matter of agreement between employer and employee. Some common examples are: pension fund, medical service, life insurance, union dues, etc.

# PAYROLL CALCULATIONS

From the following information and time cards, prepare the payroll for the 10 employees of the A.B.C. Construction Company for the week ending January 31, 19— Not all businesses operate on the same rules. The following, however, represents a not uncommon pattern.

- (1) Regular hours are from 7:30 a.m. to 4:00 p.m.
- (2) Lunch time at noon is one-half hour.
- (3) Time cards are clocked twice a day — entering and leaving.
- (4) All time over 8 hours a day is overtime at time-and-a-half rates.
- (5) Saturday work is at time-and-a-half rates.
- (6) Overtime and lateness are based on quarter-hour periods. No overtime is allowed before 7:30 a.m.
- (7) Deductions from wages are for:
  - (a) Income tax — Tables will be supplied by the instructor.
  - (b) Unemployment insurance — on wages over \$48 per week, 54 cents weekly.
  - (c) Vacation pay — 2% of weekly gross earnings.

NUMBER	NAME	EMPLOYEES' EXEMPTION FOR INCOME TAX
1	Henry Holmes	\$1,000
2	Sam Smith	2,150
3	James Jones	2,550
4	Thomas Thompson	2,550
5	Ronald Roberts	2,000
6	Peter Pollard	2,000
7	Bruce Barton	2,000
8	Frank Foster	1,000
9	Gary Grant	2,000
10	David Dunn	1,000

Complete the Time Cards on pages 55, 56 and 57. From these Time Cards, prepare the Payroll Summary on page 58. From the Summary prepare the Currency Memorandum and Requisition on page 59.

TIME CARD			
Week Ending:		January 31, 19—	
Name: Henry Holmes		No. 1	
DAY	IN	OUT	HOURS
M	7:26	4:05	
T	7:35	5:12	
W	7:49	3:49	
T	7:20	4:08	
F	8:19	4:06	
S	7:26	11:34	
	HOURS	RATE	EARNINGS
Regular Time		\$1.40	
Overtime			
Total Earnings			

TIME CARD			
Week Ending:		January 31, 19—	
Name: Sam Smith		No. 2	
DAY	IN	OUT	HOURS
M	7:16	6:28	
T	7:38	4:02	
W	7:22	3:36	
T	7:15	4:11	
F	7:17	4:42	
S	7:25	4:03	
	HOURS	RATE	EARNINGS
Regular Time		\$1.55	
Overtime			
Total Earnings			

# PAYROLL CALCULATIONS

TIME CARD			
Week Ending:		January 31, 19—	
Name: James Jones		No. 3	
DAY	IN	OUT	HOURS
M	7:16	2:42	
T	8:02	4:14	
W	7:20	6:02	
T	7:42	4:02	
F	7:28	4:48	
S	7:29	4:03	
		HOURS	RATE
Regular Time			\$1.70
Overtime			
Total Earnings			

TIME CARD			
Week Ending:		January 31, 19—	
Name: Thomas Thompson		No. 4	
DAY	IN	OUT	HOURS
M	7:18	4:08	
T	7:20	4:49	
W	7:19	5:02	
T	7:22	5:32	
F	7:16	4:05	
S	7:25	11:10	
		HOURS	RATE
Regular Time			\$1.75
Overtime			
Total Earnings			

TIME CARD			
Week Ending:		January 31, 19—	
Name: Ronald Roberts		No. 5	
DAY	IN	OUT	HOURS
M	7:21	4:02	
T	7:08	4:02	
W	7:46	4:35	
T	7:19	5:02	
F	7:32	4:01	
S	7:15	3:40	
		HOURS	RATE
Regular Time			\$1.80
Overtime			
Total Earnings			

TIME CARD			
Week Ending:		January 31, 19—	
Name: Peter Pollard		No. 6	
DAY	IN	OUT	HOURS
M	7:18	4:03	
T	7:20	4:33	
W	7:25	4:02	
T	7:29	4:04	
F	7:18	4:01	
S	7:22	4:17	
		HOURS	RATE
Regular Time			\$1.90
Overtime			
Total Earnings			



# PAYROLL CALCULATIONS

TIME CARD			
Week Ending:		January 31, 19—	
Name: Bruce Barton		No. 7	
DAY	IN	OUT	HOURS
M	7:06	4:03	
T	7:10	5:01	
W	7:19	4:02	
T	7:20	5:02	
F	7:08	4:47	
S	7:25	4:01	
	HOURS	RATE	EARNINGS
Regular Time		\$1.50	
Overtime			
Total Earnings			

TIME CARD			
Week Ending:		January 31, 19—	
Name: Frank Foster		No. 8	
DAY	IN	OUT	HOURS
M	7:15	4:05	
T	7:20	4:04	
W	7:22	4:02	
T	7:22	4:03	
F	7:21	4:05	
S	7:20	4:05	
	HOURS	RATE	EARNINGS
Regular Time		\$1.75	
Overtime			
Total Earnings			

TIME CARD			
Week Ending:		January 31, 19—	
Name: Gary Grant		No. 9	
DAY	IN	OUT	HOURS
M	7:21	4:05	
T	7:28	5:05	
W	7:19	5:06	
T	8:10	4:03	
F	7:25	4:06	
S	7:26	12:01	
	HOURS	RATE	EARNINGS
Regular Time		\$1.60	
Overtime			
Total Earnings			

TIME CARD			
Week Ending:		January 31, 19—	
Name: David Dunn		No. 10	
DAY	IN	OUT	HOURS
M	7:22	4:06	
T	7:20	5:06	
W	7:27	5:03	
T	7:18	4:08	
F	7:20	4:02	
S	7:24	4:03	
	HOURS	RATE	EARNINGS
Regular Time		\$1.65	
Overtime			
Total Earnings			

A. B. C. CONSTRUCTION COMPANY

## Payroll Summary

(1) Vacation pay is 2% of Earnings.

Add to Earnings to obtain Gross Wages.

(2) Income Tax is based on Gross Wages.

Week Ending.....19...

## PAYROLL SUMMARY

[illegible]

# PAYROLL CURRENCY MEMORANDUM

The currency memorandum and the currency requisition are required when wages are paid in currency instead of by cheque. The Currency Memorandum is made up according to the take-home pay shown on the Payroll Summary. In tabulating the currency required, give the highest denominations according to the columns provided on the memorandum; that is, give a \$10 bill rather than two \$5 bills, etc.

The Currency Requisition is made up from the totals at the foot of the Currency Memorandum. The currency requisition is taken to the bank in order that the correct number of bills and coins of each denomination may be obtained for the pay envelopes.

[illegible][illegible]

## GENERAL PRACTICE IN FUNDAMENTAL OPERATIONS

1. The Net Worth of a business is the difference between its assets and its liabilities. Complete the following tabulation and prove by totals.

(1)

(2)

[illegible]

2. The following represents the earnings and deductions as shown on pay cheques. Find the take-home pay by adding the deductions and subtracting the sum from the earnings. Prove by totals.

[illegible]



# UNIT 7

## INCOME TAX RETURNS

### THE T1 SHORT INCOME TAX FORM

At the end of each year, the employer must report to the nearest District Taxation Office the wages earned and income tax deducted for each employee. The report is made on a small form called T4 Supplementary. Two copies of the form are given to the employee, one of which is to be attached to his Income Tax Return.

Since income tax regulations change frequently, the current income tax return is not reproduced in this Workbook. It is suggested that the instructor provide the class with the current form (these are readily available) and have these forms used in computing the tax as required in the following problems. For the problems on this worksheet and the next, the T1 Short form is required. This form is for use by individuals whose earned income of any amount is solely from salary, wages or pension, and whose investment income, if any, is not over \$2,400.

1. Find the income tax payable or refundable in the following cases.

(1) TAXPAYER A

- (a) Unmarried, no dependents.
  - (b) Wages (before income tax or pension deductions), \$3,750.
  - (c) Pension plan contributions \$100.
  - (d) Allowable union dues paid \$40.
  - (e) Income other than in (b), NIL.
  - (f) Personal exemptions, \$1,000.
  - (g) Charitable donations, \$75.
  - (h) Medical expenses, NIL.
  - (i) Tax deducted at source, \$495.50.
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(2) TAXPAYER B

- (a) Married. Wife has no income. Dependents: daughter, 14 years of age; son, 18 years of age. Both dependents are at school.
  - (b) Wages before income tax deductions, \$3,855.20.
  - (c) Union dues paid — allowable, \$40.
  - (d) Personal exemptions, \$2,550.
  - (e) Charitable donations, \$60.
  - (f) Medical expenses — receipts held for a total of \$205.50
  - (g) Tax deductions at source, \$247.
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THE T1 SHORT INCOME TAX FORM

(3) TAXPAYER C

- (a) Married — Both the taxpayer and his wife are receiving the old age security pension of \$40 a month. There are no other dependents.
- (b) T4 Supplementary form from his employer shows remuneration before deductions, \$729.04; income tax deducted, \$81.
- (c) T5 form from the Bank of Nova Scotia shows \$189.09 earned as interest on a savings account.
- (d) Pension received from Carpenters' Union, \$180.
- (e) Allowable union dues, \$12.
- (f) Medical expenses — receipts held for a total of \$150.

N.B. The student is expected to compute the exemptions in the above case according to the information on the T1 Short form. Note that the taxpayer is at least 70 years of age.

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(4) TAXPAYER D (Under 65 years of age)

- (a) Widower — maintains his own home, employs a housekeeper and supports a dependent daughter aged 18.
- (b) T4 Supplementary received from his employer shows remuneration before deductions, \$6,200; tax deducted, \$715; pension contributions by taxpayer, \$325.
- (c) Allowable union dues, \$36.
- (d) Interest on bonds received, \$150.
- (e) Dividends from taxable Canadian corporations received, \$50.
- (f) Charitable donations, \$145.
- (g) Medical expenses for the current year, \$80.

(Compute the exemptions according to the information on the T1 Short Form.)

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## THE T1 GENERAL INCOME TAX FORM

Individuals whose earnings are *not* solely from salary, wages or pension and whose investment income, if any, is over \$2,400 should use Form T1 General for income tax returns. This classification includes individuals in business as proprietors or partners, farmers, fishermen, individuals receiving professional fees or commissions and individuals claiming foreign tax credits.

The chief problem in computing tax where this form is required is in determining what is allowed by law to be deducted from the gross income in order to find the net income or taxable income. There is a multiplicity of regulations covering what must be included as income and what is allowable as deductions, and it is necessary to have reference to the regulations in order to make a proper return. In many cases, particularly businesses, the completion of the return requires a knowledge of accountancy as well as familiarity with the regulations.

The following problems are based on some of the sections of the T1 General Form. The student should have a copy of this form (It is readily available.) and refer to it when solving the problems.

Computing Capital Cost Allowance (Depreciation on Buildings, Equipment and Other Fixed Assets) on Property Used in the Earning of Income. (See page 4 of the T1 General.)

Depreciation is calculated on the *reducing balance method*. Classes and rates are fixed by regulation. The rate varies with the class.

EXAMPLE—Cost of building acquired in 1957 .....	\$25,000.00
Capital cost allowance for 1957 (5% of \$25,000) .....	1,250.00
Value for capital cost allowance, 1958 .....	23,750.00
Capital cost allowance for 1958 (5% of \$23,750) .....	1,187.50
Value for capital cost allowance, 1958 .....	22,562.50
Capital cost allowance for 1958 (5% of \$22,562.50) .....	1,128.13
Value for capital cost allowance, 1959 .....	21,434.37

1. Compute the capital cost allowance for 1959 on a truck purchased January, 1957, at a cost of \$4,000. The rate for this class of property is 30%.

## THE T1 GENERAL INCOME TAX FORM

2. Calculate the capital cost allowance for 1959 on furniture and office equipment which at the beginning of the year 1957 was valued for capital cost allowance purposes at \$2,455.50. The rate for this class of property is 20%.

### Computing the Net Income from Rentals (See page 3 of the T1 General)

Income from rented property is known as *investment income*. From the gross rental income, the following expenses are deductible: Taxes (property), repairs, interest on mortgages, insurance and capital cost allowance. (N.B. To determine what other expenses incurred in renting property are deductible, it is necessary to refer to the regulations.)

1. Calculate the net income from renting a piece of property purchased in 1956 at a cost of \$40,000. Deductible expenses are: taxes — 58 mills on an assessment of \$16,000; repairs, \$250; interest on a \$10,000 mortgage on the property at 5%; insurance, \$100; capital cost allowance at 5% from 1956 to 1959. Gross income from rental of the property in 1959 was \$4,320.



## THE T1 GENERAL INCOME TAX FORM

2. Calculate the net rental income from the following data: Gross rental income, \$2,700; taxes, 58 mills on an assessment of \$13,000; interest at 5% on a \$5,000 mortgage on the property; insurance, \$45; capital cost allowance of 5% on undepreciated capital cost value of \$30,000; agent's commission, \$135.

### Computing the Net Income from Dividends (see T1 General, page 3.)

Dividends on stock is also investment income. From the gross income from dividends, the following expenses are deductible: (1) Carrying charges; e.g., interest on the money borrowed to purchase the stocks. (2) Depletion allowances on dividends from stocks in mining and oil companies (but not on industrial stocks). The rate of depletion is 10%, 15% or 20%, depending on the proportion of mineral profits to the total profits of the corporation. (3) One-half the fees paid in the year on investment counsel on the advisability of purchasing or selling specific shares or securities.

1. Find the net income from the dividend of \$301.50 from the Fictitious Oil Co. (Depletion allowance, 20%) Interest on money borrowed to purchase the stocks, \$75.

2. Find the net income from the following dividends:

From the Bell Telephone Co., \$400.

From the Makebelieve Mines, \$188.24. (Depletion allowance, 15%)

Interest paid in connection with the purchase of the stock, \$26.50.

Fees paid to an investment counsel for advice on the above investment, \$10.

# THE T1 GENERAL INCOME TAX FORM

## Calculating Taxable Income from a Business (See T1 General, page 4.)

1. Following the pattern of the statement of income and expense shown on page 4 of the T1 General Form, calculate the taxable income for 1959 of J. Doe, proprietor of a hardware business, according to the data given below. (The question of what may be allowable under the several classes of expense is not a part of this problem. This can be correctly determined only by careful reference to the many regulations concerned.)

INCOME		EXPENSES	
Sales .....	\$387,240	Salaries Paid to Employees.....	\$41,673
Opening Inventory.....	49,228	Interest Paid on Mortgage.....	600
Purchases.....	304,016	Taxes and Licenses.....	1,875
Closing Inventory.....	42,189	Repairs and Maintenance.....	568
Reserve for Doubtful Debts, 1957.	2,977	Auto and Truck Expenses.....	5,988
		Travelling Expense.....	2,000
		Other Expenses.....	3,240
		Capital Cost Allowance.....	2,961
		Reserve for Doubtful Debts, 1958.	3,725

The proprietor's salary of \$6,000 is included in the above list of expenses. Refer to T1 General, page 4, under Adjustments to Income for treatment of this item.

Assuming that the net income obtained represents the total income of J. Doe for the year 1959, and that his personal exemptions amount to \$2,550, and his charitable donations are \$500, compute his tax payable according to the rates shown on the T1 General Form, page 2.

THE T1 GENERAL INCOME TAX FORM

2. Following the pattern as shown on page 2 of the T1 General Form, calculate the tax payable in the following cases.

(1) Net income from business, \$9,500; net income from investments: rentals, \$240; dividends from Canadian corporations, \$325 (Note that a percentage of these net dividends is deductible from the tax payable.); personal exemptions, \$2,800; charitable donations, \$350.

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(2) Net income from business, \$12,450; net income from dividends received from Canadian corporations, \$825; old age security pension received, \$480; personal exemptions, \$2,500; charitable donations, \$800.

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(3) Net income from business, \$18,675; net income from investments: rentals, \$580, dividends from Canadian corporations, \$250 (after allowance for depletion); interest received on bonds, \$480; personal exemptions, \$2,000; charitable donations, \$900.

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# GENERAL PRACTICE IN FUNDAMENTAL OPERATIONS

1. Total the Deductions and subtract from the Gross Amount to find the Net Amount. Prove by totalling the columns.

No.	GROSS AMOUNT	DEDUCTIONS				TOTAL DEDUCTIONS		NET AMOUNT	
		(A)	(B)	(C)	(D)				
1	\$ 85.60	\$ 4.30	\$ 2.10	\$ 5.00	\$ 1.75				
2	73.80	5.27	1.80	6.25	1.00				
3	75.25	3.96	2.75	4.32	.95				
4	83.42	5.97	3.35	3.80	2.60				
5	71.48	4.88	3.53	6.20	1.80				
6	86.38	6.39	2.68	5.32	1.36				
7	69.50	4.27	1.80	3.40	.86				
8	72.38	5.10	2.15	4.63	2.25				
9	85.30	6.37	1.85	5.13	1.75				
10	79.75	4.92	2.30	7.16	1.39				
11	79.40	5.46	7.19	2.18	.89				
12	91.34	3.70	3.63	1.17	2.14				
13	83.64	4.90	4.81	2.54	1.37				
14	80.50	3.98	3.67	1.47	1.23				
15	86.73	5.18	4.13	2.19	1.15				
16	88.44	6.25	3.96	1.80	.88				
17	93.21	5.86	4.75	2.23	1.46				
18	90.33	7.41	5.60	3.43	1.35				
19	78.95	4.86	3.97	2.86	1.10				
20	79.22	5.61	2.89	1.90	.77				
21	78.77	4.49	4.36	2.85	2.33				
22	86.48	5.37	3.84	5.41	1.36				
23	91.38	6.41	4.83	3.33	1.27				
24	90.66	5.32	5.90	4.10	1.45				



# UNIT 8

## STOCK TRANSACTIONS

### DEFINITION AND PURCHASE OF STOCK

A new company obtains capital wherewith to start business by selling shares of the company stock. Shares of stock are issued in the form of certificates, each representing one or more shares, according to the number purchased by the subscriber.

Stock having a specified value, known as *par value*, may be issued. Industrial stocks with a par value of \$100 are usually issued, and may not be sold to original subscribers at less than par value. This rule, however, does not apply to mining stocks. *No par value* stock has no specified face value and may be sold at any price upon which the promoters of the company may decide.

With the exception of the shares of private companies, once stock has been issued, it may be bought and sold on the public market. *Stock exchanges* are centres for trading in stocks. The stock exchanges are connected by wire to agencies, called *stock broker offices*, which are located in all the principal towns and cities, and the fluctuations in stock prices are transmitted directly to the stock brokers.

The arithmetic of this unit is concerned with the following:

- (1) The purchase of stock — computing the cost.
- (2) The selling of stock — computing the proceeds.
- (3) The income from investing in stock — dividends and the yield.
- (4) Buying stock on margin — stock brokers' accounts.

#### The Purchase of Stock

In addition to the market price of a stock, the purchaser must pay the broker a commission, called *brokerage*, for his services in putting through the transaction. The scale of brokerage fees is shown below.

Industrial Stocks			Mining Stocks		
PRICE PER SHARE		BROKERAGE PER SHARE	PRICE PER SHARE		BROKERAGE
Under \$	.50	\$ .01	Under \$	.05	\$ 1.50 per M
At	.50 and under \$ 1.00	.02	At	.05 and under \$ .10	3.00 " M
"	1.00 " " 2.00	.04	"	.10 " " .25	5.00 " M
"	2.00 " " 3.00	.06	"	.25 " " .50	7.50 " M
"	3.00 " " 4.00	.08	"	.50 " " .75	10.00 " M
"	4.00 " " 5.00	.10	"	.75 " " 1.00	15.00 " M
"	5.00 " " 7.50	.15	"	1.00 " " 2.00	2.00 " C
"	7.50 " " 10.00	.20	"	2.00 " " 3.00	3.50 " C
"	10.00 " " 15.00	.25	"	3.00 " " 4.00	5.00 " C
"	15.00 " " 25.00	.30	"	4.00 " " 5.00	7.00 " C
"	25.00 " " 40.00	.35	"	5.00 " " 7.50	10.00 " C
"	40.00 " " 60.00	.40	"	7.50 " " 10.00	15.00 " C
"	60.00 " " 80.00	.45	"	10.00 " " 15.00	20.00 " C
"	80.00 " " 100.00	.50	"	15.00 " " 20.00	25.00 " C
"	100.00 " " 110.00	.55	"	20.00 " " 25.00	30.00 " C
"	110.00 " " 120.00	.60	"	25.00 " " 40.00	35.00 " C
Over	120.00.....	$\frac{1}{2}\%$ of price	"	40.00 " " 60.00	40.00 " C
			"	60.00 " " 80.00	45.00 " C
			"	80.00 " " 100.00	50.00 " C
			"	100.00 " " 110.00	55.00 " C
			"	110.00 " " 120.00	60.00 " C
			Over	120.00.....	$\frac{1}{2}\%$ of value

# PURCHASE OF STOCK

EXAMPLE—What would be the cost of 20 shares of Canadian Cannery at \$18.50 a share; brokerage, 30 cents a share?

20 shares at \$18.50.....	\$370.00
Brokerage: 20 shares at 30 cents.....	6.00
Total cost.....	<u>\$376.00</u>

1. Find the cost of purchasing 1500 shares of Paymaster Gold mining stock at 53 cents a share; brokerage, \$7.50 per M shares.

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2. Find the cost of buying 10 shares of Sherwin Williams (Industrial stock) at \$130½; brokerage according to the table given on Worksheet No. 69.

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3. Find the cost of purchasing the following stocks. Insert and use brokerage rates according to the table given on Page 69.

No.	Stock	NUMBER OF SHARES	PRICE PER SHARE	BROKERAGE RATE	COST
1	Dominion Stores Common	20	\$12½		
2	Canada Packers B	30	30¼		
3	Walker-Gooderham	25	43⅝		
4	Noranda Gold Mines	10	76		
5	Steep Rock Mines	100	8.45		
6	Maple Leaf Milling Common	20	8½		
7	Ford Motor of Canada A Com.	10	63½		
8	Silverwood's Dairies Com.	25	17		
9	Bell Telephone of Canada	5	39		
10	International Nickel Pref.	25	42		

## SALE OF STOCK

### Computing the Proceeds

The broker charges the seller of the stock a commission for his services in selling the stock. Also, on all sales of stock, a *transfer tax* is levied by both the Federal Government and the government of the province in which the stock is sold. Both the brokerage and the transfer tax will be deducted by the broker from the sale price of the stock.

The scale of the government transfer tax is as follows:

PRICE PER SHARE	TAX
Under \$ 1	1/10 of 1% of value
From 1 to \$ 5	$\frac{1}{4}$ ¢ per share
" 5 " 25	1¢ per share
" 25 " 50	2¢ per share
" 50 " 75	3¢ per share
" 75 " 150	4¢ per share
Over 150	4¢ per share plus 1/10 of 1% of value in excess of \$150
Bonds	3¢ for each \$100.

The above rate is collected by both the Federal and Provincial governments.

**EXAMPLE**—Find the proceeds from the sale of 25 shares of Canadian Pacific Railway stock at \$31 a share; brokerage, 35 cents a share; transfer tax, 2 cents a share.

25 shares at \$31	\$775.00
Less: Brokerage, 25 shares at \$.35	\$8.75
Transfer tax, 25 shares @ \$.04	1.00
	9.75
Net proceeds	<u>\$765.25</u>

1. Find the net proceeds from the sale of 5 shares of Canadian Industries stock at \$37 $\frac{1}{4}$ ; brokerage and transfer tax should be charged according to the tables given.

2. Find the proceeds from the sale of 200 shares of Lake Shore Gold Mines at \$8.30 a share; brokerage and transfer tax should be charged according to the tables given.

## SALE OF STOCK

### Computing the Proceeds

1. Find the proceeds from the sale of the following stocks at the prices given. Compute the amounts for brokerage and transfer tax according to the tables previously given.

No.	STOCK	NUMBER OF SHARES	MARKET PRICE	AMOUNT OF SALE	DEDUCTIONS				NET PROCEEDS
					BROK-ERAGE	TRANSFER TAX			
1	Algoma Steel	50	\$47 $\frac{1}{4}$						
2	Laura Secord	25	\$16						
3	National Grocers	14	\$12 $\frac{1}{2}$						
4	Hollinger Mines	100	\$15 $\frac{1}{2}$						
5	Kirkland Lake M.	125	\$.75						
6	Goodyear Tires	10	\$89						
7	Loblaw Inc.	20	\$38						
8	Gillies Lake Gold M.	1,500	\$.09 $\frac{1}{4}$						
9	Orange Crush	150	\$3.70						
10	General Motors	5	\$63 $\frac{1}{2}$						

### Income from Investment in Stocks—Dividends and Yield

When a company declares a dividend, part of the net profits or surplus is set aside to be divided among the shareholders. In this connection, two classes of stock must be considered — *preferred stock* and *common stock*. A company may have issued both classes of stock.

Preferred stock has a fixed rate of dividend, usually stated as a per cent of the par value of the stock. Dividends on preferred stock must be paid before any dividends are paid on common stock. The dividend rate on common stock is usually stated in dollars and cents per share.

Preferred stock may be *cumulative*. This means that if in any year a dividend is deferred, it will accumulate and must be paid when the profits permit and before any dividends are paid on common stock.

A *participating* preferred stock is one which participates or shares in excess profits after the fixed rate on the preferred stock has been paid and a dividend has been allocated to the common stock. The degree of participation is determined by the conditions under which the stock has been issued.

The *yield* of a stock is the annual rate obtained by finding the per cent which the dividend paid is of the market price of the stock.



# INCOME FROM STOCK

## Dividend and Yield

EXAMPLE—A man bought 25 shares of Winnipeg Electric 5% preferred (par value \$100) at \$96. What would be the total annual dividend? What is the yield on the stock?

Dividend on 1 share, par value \$100, at 5% = \$5.00.  
 Dividend on 25 shares at \$5.00 per share = \$125.00.  
 Cost of 1 share is \$96.00 plus brokerage of \$.50 = \$96.50.  
 Dividend received on an investment of \$96.50 = \$5.00.

Yield per cent (per \$100 investment) =  $\frac{5.00}{96.50} \times 100 = 5.18\%$ .

1. Find the total annual dividend and the rate of yield on an investment in 50 shares of Goodyear Tires 4% preferred (par value \$50) at \$47½ a share. Consider brokerage charges.

2. Find the annual dividend and the rate of yield on an investment in 30 shares of Imperial Tobacco 4% preferred (par value \$25) at \$23 per share. Consider brokerage charges.

3. Find the total cost and yield of the following investments.

No.	Stock	SHARES BOUGHT	PAR VALUE	PRICE	BROKER-AGE	TOTAL COST	% YIELD
1	B.C. Electric 4½% Pfd.	10	\$100	\$ 88			
2	Power Corp. 6% Pfd.	20	\$ 50	\$ 56			
3	Virginia Dare 5% Pfd.	30	\$ 25	\$ 16			
4	Tuckett Tobacco 7% Pfd.	10	\$100	\$130			
5	Penmans Ltd. 6% Pfd.	5	\$100	\$104½			

## INVESTMENT PROGRAM PROBLEMS

1. How much would have to be invested in a 6% stock quoted at  $\$119\frac{5}{8}$  (brokerage, 60 cents a share) to produce an annual dividend of \$1,500?

2. A man sold 75 shares of an 8% preferred stock at \$175 and invested the proceeds in a 6% preferred stock at \$120.

- (a) How many shares of the 6% stock did he buy? (Consult the tables already given for brokerage and transfer tax rates. You are reminded also that a fraction of a share cannot be purchased.)
- (b) What change did he make in his annual dividend?
- (c) Compare the yield of the two stocks.

3. A man held 200 shares of a mining stock on which his last quarterly dividend was 70 cents a share. The current price of the stock is \$20 a share. A friend advised him to sell the stock and invest the proceeds in an industrial 8% preferred stock, currently selling at \$146 a share. Compare the yield of the two stocks. (Ignore brokerage and transfer tax in this problem.)

## BUYING STOCK ON MARGIN

When stock is bought on *margin*, the buyer orders the broker to buy but pays only a part of the purchase price at the time of purchase, the broker providing the balance of the funds required for the purchase. Ordinarily, the purchaser does not intend to complete paying for the stock, the purchase being made in anticipation of a rise in the price of the stock and of selling at a profit.

If the stock goes up in value, the broker will sell only at the speculator's order. When the sale is made, the speculator gets back his margin payment plus the profit on the transaction.

On the other hand, if the stock declines in value, the broker will sell the stock *before* the decline has become sufficient to wipe out the margin — unless, of course, the speculator increases his margin payment. It is obvious that in this type of transaction the speculator may suffer serious loss due to a temporary decline in the price of a stock which may later recover from the decline in price.

Because the broker has used his own money and has also had the use of the buyer's marginal payment, the interest factor must be considered over the period of the transaction. Interest is charged on the purchase price plus brokerage and is allowed on the margin payment, the whole transaction being recorded in the broker's books as illustrated below.

1. On January 2, 19—, F. Foster deposited with his broker \$600 as margin for the purchase of 50 shares of Canadian Steamships at \$66. The stock was sold on January 26 at \$72. Allowing 6% on deposit and charging 6% on the purchase price and brokerage at 45 cents a share each way, make the necessary calculations to complete the account as illustrated below.

### F. FOSTER

DR.

CR.

19— Jan.	2	50 shares Can. Steamships @ \$66			19— Jan.	2	Cash — margin deposit		
	2	Brokerage on 50 shares @ 45 cents a share				26	50 shares Can. Steamships @ \$72		
	26	Interest on total cost @ 6% for 24 days				26	Interest on margin @ 6% for 24 days		
	26	Brokerage on sale of 50 shares @ 45 cents							
	26	Balance due F. Foster							

## STOCK BROKERS' ACCOUNTS

1. Write up the stockbroker's accounts for the following transactions.

(1) On March 3, D. Dunn bought 100 shares of Dominion Bridge at  $\$72\frac{1}{2}$ , putting up  $\frac{1}{3}$  of the price as margin. On April 15 (the following month), he sold the stock at  $\$80$ . How much did he make on the transaction, brokerage being 45 cents each way and the interest rate being 6%? (Ignore the transfer tax in this transaction.)

[illegible]

(2) On June 1, a broker bought for F. Fox 200 shares of Fanny Farmer at \$27. On July 1 (the following month), he sold 100 shares at  $\$25\frac{1}{2}$ , and on August 1 he sold the remainder at \$25. Allowing brokerage at 35 cents a share for each transaction and 6% interest, how does the account stand when the stock has been sold? The margin deposited in this case was \$2,000.

[illegible]



# GENERAL PRACTICE IN FUNDAMENTAL OPERATIONS

1. Add and check the following columns of figures.

(1)	(2)	(3)	(4)	(5)	(6)
4875.93	9465.24	2537.40	3648.96	4763.96	4758.29
3957.28	2649.95	4728.40	1375.29	1592.14	9513.08
4082.16	1851.38	3196.12	3628.96	1968.25	4836.45
4573.65	1234.50	9851.44	3452.18	9213.25	9575.75
1573.28	9574.13	1274.90	4717.33	5835.56	1453.85
8493.80	2535.65	3485.15	9075.12	8245.37	5726.18
4763.97	3759.24	7482.49	1867.46	9714.11	3628.83
6483.36	4758.39	2859.46	3759.07	4685.55	1475.28
8457.27	2648.96	9705.38	2859.49	2846.16	6984.13
2748.69	2957.95	2859.47	8392.11	4535.25	8546.52
6483.97	9786.69	2975.15	9533.55	2748.44	4865.29
7214.37	9398.99	2846.16	2947.85	4837.35	2635.88
1176.44	2846.56	2435.57	3546.68	1235.46	5768.90
7564.97	8675.53	7564.32	6453.21	4758.49	2758.48
7463.18	2856.98	2649.69	2840.47	2746.19	2750.10
5748.76	1243.55	1354.67	1467.78	1574.92	1987.65

2. Compute the dividends in each case. Total the columns.

No.	PAR VALUE OF STOCK	Dividends								TOTAL DIVIDENDS	
		4%		4½%		5%		5½%			
1	\$ 20,000										
2	15,000										
3	25,500										
4	28,800										
5	32,200										
6	59,000										
7	44,600										
8	12,000										
9	11,700										
10	21,500										
11	19,200										
12	17,300										
13	75,900										
14	85,100										

## UNIT 9

### COMPOUND INTEREST

#### BASIC CALCULATIONS

##### Calculating the Amount of a Specified Principal at Compound Interest

When *compound interest* is calculated, the interest which is due at the end of an interest period is added to the principal, and the sum thus obtained becomes the new principal for the succeeding period. In *simple interest*, it will be remembered, the principal remains the same whether the interest is paid or not.

EXAMPLE: A person invested \$100 at 3% compounded annually. To what amount will the \$100 have accumulated at the end of 3 years?

Principal beginning the first year	\$100.00
Interest on \$100 @ 3% for the first year	3.00
Principal beginning the second year	<u>103.00</u>
Interest on \$103 @ 3% for one year	3.09
Principal beginning the third year	<u>106.09</u>
Interest on \$106.09 for one year @ 3%	3.1827
Amount at the end of the third year	<u><u>109.2727</u></u>

The compound interest is \$109.2727 - \$100.00 or \$9.2727. (The simple interest on \$100 at 3% for 3 years would be \$9.00.)

1. To what amount would \$250 accumulate in 4 years at 5%, compounded annually?

2. A deposited \$200 in a bank savings account, interest to be compounded half-yearly at  $1\frac{1}{2}\%$ . Provided no withdrawals are made, what will be the amount accumulated at the end of two years?

It is obvious that computing compound interest by the preceding method would be a laborious task if the number of years were great. The work may be greatly curtailed by using the *Table* for the *Compound Amount of \$1*. (See page 105.)

In these tables, the compound amount of \$1 at certain rates of interest for any number of years up to 40 has been given. To find the amount for any principal other than \$1, merely multiply that principal by the corresponding amount of \$1 as given in the table.

EXAMPLE—What would \$100 amount to in 3 years at 3% compounded annually?

By reference to the table, we find that the compound amount of \$1 at 3% for 3 years is \$1.092727.

The compound amount of \$100, therefore, would be  $100 \times 1.092727$  or \$109.2727.

Compare the above answer with that obtained by the long method on the preceding worksheet. The examples are the same.

1. Using the compound interest table, show solutions for the following problems.

(1) To what sum would \$2,500 accumulate in 15 years at 5%, compounded annually?

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(2) Find the compound interest on \$800 at 6% for  $12\frac{1}{2}$  years. (Use the table to find the amount for 12 years, then find the simple interest on that amount for a half-year.)

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(3) What amount of interest would accumulate on \$1,000 invested at 3%, compounded semi-annually for 10 years? (For compounding semi-annually, halve the rate and double the time.)

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(4) A father invests \$1,000 in trust for his son on his fifth birthday, the amount to accumulate and to be paid to the son on his 21st birthday. The money earns 5% per annum and the interest is to be invested at the same rate. What sum will the son receive?

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**Calculating the Present Value of an Amount at Compound Interest**

**EXAMPLE**—Under an agreement, a person has the option of receiving \$109.27 three years from now or an immediate cash settlement based on an interest rate of 3% compounded annually. What would be the amount of the cash settlement?

The problem here is to find that principal which invested now at 3% compounded annually for three years would amount to \$109.27. This is the converse of the example given on Page 79.

By reference to the table for the compound amount of \$1, we find that \$1, invested at 3% for 3 years, amounts to \$1.092727. The problem, therefore, may be solved as follows:

$$\begin{array}{rcl}
 \$1.092727 \text{ is the amount from an investment of } & \$1.00 & \\
 \$1.00 & \text{'' '' '' '' '' '' '' ''} & \frac{1.00}{1.092727} \\
 & & 1.092727 \\
 \$109.27 & \text{'' '' '' '' '' '' '' ''} & \frac{109.27 \times 1.00}{1.092727} = \$100.00.
 \end{array}$$

1. Using the table for the compound amount of \$1, show solutions for the following problems.

(1) What is the present value of an amount of \$5,000 due 10 years from now, money being worth 5%?

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(2) What sum put out at interest at 4%, compounded annually for 20 years, will accumulate to \$1,200?

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(3) What immediate cash settlement would satisfy a claim of \$10,000 due 8 years from now if money is worth 3%?

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(4) What sum will amount to \$2,912.71 in 15 years at 6%, compounded semi-annually? (Halve the rate and double the time.)

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# BASIC CALCULATIONS IN COMPOUND INTEREST

1. Find the amount and the compound interest.

No.	PRINCIPAL	RATE	TIME	AMOUNT		COMPOUND INTEREST	
1	\$5,000	4% (annually)	14 years				
2	5,000	4% (semi-annually)	14 "				
3	540	3% (annually)	5 "				
4	268	5% (annually)	12 "				
5	925	1½% (annually)	10 "				
6	1,500	6% (semi-annually)	15 "				
7	1,500	6% (annually)	15 "				
8	3,000	3% (semi-annually)	20 "				
9	3,000	3% (annually)	20 "				
10	1,200	5% (annually)	12 "				

2. Find the present value and the compound interest.

No.	AMOUNT	RATE	TIME	PRESENT VALUE		COMPOUND INTEREST	
1	\$ 1,250	1½% (annually)	20 years				
2	2,500	3% (semi-annually)	18 "				
3	3,000	4% (annually)	16 "				
4	4,175	4% (semi-annually)	16 "				
5	3,750	5% (annually)	15 "				
6	5,400	6% (annually)	10 "				
7	10,500	5% (annually)	12 "				
8	13,450	4% (annually)	21 "				
9	15,000	6% (annually)	30 "				
10	20,000	5% (annually)	19 "				

## ANNUITIES

An *annuity* is a specified sum of money paid at equal periods — annually, semi-annually, etc. — its accumulation being subject to compound interest.

Business applications of annuities are chiefly in the field of finance; for example, insurance, pension plans, sinking funds for the redemption of bonds, or liquidation of a debt and other situations where periodic payments are involved. Many of the problems arising out of these applications require intricate calculations and are not included in this unit. Here are presented only elementary problems illustrating the basic aspects of annuities. The three basic aspects are as follows:

- To find to what amount an annuity will accumulate.
- To find what annuity will accumulate to a given amount.
- To find the present value of an annuity.

### Calculating the Amount an Annuity

EXAMPLE—What will be the amount of an investment of \$1, made at the end of each year for three years, at 3% compounded annually? In other words, what is the value of an annuity of \$1 at 3% for 3 years?

Annuity at end of the first year	\$1.00
Interest on \$1.00 for 1 year at 3%	<u>.03</u>
	1.03
Annuity at the end of the second year	<u>1.00</u>
	2.03
Interest on \$2.03 for 1 year at 3%	<u>.0609</u>
	2.0909
Annuity at the end of the third year	<u>1.00</u>
Amount of an annuity of \$1 for 3 years at 3%	<u><u>3.0909</u></u>

When the annuity payment is made at the end of each period, it is known as an *ordinary annuity*.

Following the pattern of solution shown above, find the amount of an ordinary annuity of \$100 for 3 years at 3%. (If your work is done correctly, you will find that your answer is exactly 100 times the value of an annuity of \$1 for 3 years at 3% as shown above.)

## AMOUNT OF AN ANNUITY

It is obvious that the preparation of the detailed form of solution used on the preceding page would be too time consuming if any considerable number of years were involved. To facilitate the calculation of annuities, a table of the *Amount of an Annuity of \$1* is given. (See page 94.) As noted on the preceding worksheet, to find the amount of any specified annuity, merely multiply that annuity by the amount of an annuity of \$1 at the same rate and for the same time.

EXAMPLE—Find the amount of an ordinary annuity of \$100 for 3 years at 3%.

Amount of an annuity of \$1 for 3 years at 3% (See Table) = \$3.0909.

Amount of an annuity of \$100 for 3 years at 3% (See Table) =  $100 \times \$3.0909$  or \$309.09.

1. Using the table for the Amount of an Annuity of \$1, show solutions for the following problems.

(1) At the end of each year for 10 years, a man invested \$250. Principal and interest accumulated at 5% per annum. What was the total amount accumulated at the end of the 10 years?

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(2) A man has the option of receiving \$750 at the end of each year for 20 years or of allowing it to accumulate at 3% compound interest and of taking the accumulated lump sum at the end of that time. If he chooses the latter plan, what sum will he receive?

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(3) If \$500 is invested at the end of each year for 15 years, the whole bearing interest at 6% per annum, compounded annually, what will be the accumulated amount at the end of that time?

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(4) Find the amount of an ordinary annuity of \$1,500 at 4% for 12 years.

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## TYPES OF ANNUITIES

It will have been noticed that the preceding problems deal with *ordinary* annuities only — annuities paid at the end of each year. When the annuity payment is made at the *beginning* of a year, it is known as an *annuity due*. Since the annuity table has been prepared for ordinary annuities, a modification of its use is necessary when calculating annuities due. The following example will illustrate.

EXAMPLE 1—What will be the amount of an annuity of \$1 paid at the beginning of each year for 3 years at 3% compounded annually?

Annuity at the beginning of the first year	\$1.00
Interest on \$1.00 for 1 year at 3%	<u>.03</u>
	1.03
Annuity at the beginning of the second year	<u>1.00</u>
	2.03
Interest on \$2.03 for 1 year at 3%	<u>.0609</u>
	2.0909
Annuity at the beginning of the third year	<u>1.00</u>
	3.0909
Interest on \$3.0909 for 1 year at 3%	<u>.092727</u>
Amount of an annuity due of \$1 for 3 years at 3%	<u>3.183627</u>

Observe that if a fourth annuity of \$1.00 were added to the above amount, the total beginning the fourth year would be \$4.183627. This is the amount of an ordinary annuity of \$1 for 4 years at 3%. (See page 106.)

Therefore, the amount of an *annuity due* of \$1 for 3 years at 3% is the amount of an ordinary annuity for 4 years (one year more) *less* \$1.00 (the last annuity payment); that is,  $4.183627 - 1.00 = 3.183627$ .

EXAMPLE 2—Find the amount of an annuity due of \$100 for 3 years at 3%.

Amount of an ordinary annuity of \$1 for 4 years at 3% = \$4.183627.

Amount of an annuity due of \$1 for 3 years at 3% = \$4.183627 - 1.00 = \$3.183627.

Amount of an annuity due of \$100 for 3 years at 3% =  $100 \times \$3.183627 = \$318.36$ .

1. A man invested \$250 at the beginning of each year for 10 years at 5% compounded annually. What was the total sum accumulated at the end of that time?

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2. At the beginning of each year, a man pays \$300 into a pension fund. To what will his payments have accumulated at the end of 30 years, money being worth 6%?

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# TYPES OF ANNUITIES

3. The rent of a piece of property is \$600 a year, paid in advance. If no rent has been paid for 4 years, and money is worth 5%, how much is now due?

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4. Find the amount of an annuity due of \$500 a year for 15 years at 3%.

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5. A man paid a premium of \$55 a year for 20 years on an insurance policy. If the premiums were paid in advance and money is worth 6%, what is the amount of his accumulated premiums?

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6. Find the amount of the following annuities.

No.	ANNUITY	TYPE OF ANNUITY	RATE	TIME	AMOUNT	
1	\$ 150	Ordinary Annuity	6%	20 years		
2	75	Ordinary Annuity	5%	30 "		
3	225	Annuity Due	4%	15 "		
4	350	Annuity Due	5%	18 "		
5	125	Ordinary Annuity	3%	35 "		
6	260	Annuity Due	5%	25 "		
7	85	Ordinary Annuity	6%	23 "		
8	250	Annuity Due	3%	21 "		
9	415	Ordinary Annuity	4%	10 "		
10	1,225	Annuity Due	5%	10 "		
11	745	Ordinary Annuity	6%	15 "		

## TYPES OF ANNUITIES

### What Annuity Will Accumulate to a Given Amount

EXAMPLE 1—What annuity, paid at the end of each year, will amount to \$309.09 in 3 years at 3%?

Referring to the tables, we find that an annuity of \$1.00 for 3 years at 3% amounts to \$3.0909.

Since \$3.0909 is the amount of an annuity of \$1.00,

Then \$1.00 is the amount of an annuity of  $\frac{\$1.00}{3.0909}$ ,

And \$309.09 is the amount of an annuity of  $\frac{1.00 \times 309.09}{3.0909} = \$100$ .

EXAMPLE 2—What annuity paid at the beginning of each year (annuity due) will amount to \$318.36 in 3 years at 3%?

By referring to the annuity table, we find that an annuity due of \$1.00 for 3 years at 3% is (\$4.183627 - 1.00) or \$3.183627.

Since \$3.183627 (approx. \$3.1836) is the amount of an annuity due of \$1.00,

Then \$1.00 is the amount of an annuity of  $\frac{\$1.00}{3.1836}$ ,

And \$318.36 is the amount of an annuity of  $\frac{318.36 \times \$1.00}{3.1836} = \$100$ .

1. A man wishes to give his son \$1,000 on his 21st birthday, the amount to be accumulated by investing on each of his son's birthdays, beginning with the first, a certain sum. What is the required sum, assuming that the investment earns 3% compounded annually?

2. What sum of money deposited at the end of each year for the next 10 years will amount to \$800, money being worth 5%?

3. What annual investment at the beginning of each year for 15 years compounded at 6% per annum will amount to \$5,000?

# TYPES OF ANNUITIES

4. A man wishes to have accumulated \$10,000 at the end of the next 20 years. If he can invest at 5%, what amount must he invest at the end of each year to attain his objective?

5. A person plans to have accumulated a fund of \$8,000 at the end of 8 years. What sum must be invested at the beginning of each year at 6% to provide the required amount?

6. Twenty-five years from now a municipality must be able to redeem its bonds to the value of \$500,000. What sum must be invested in a sinking fund at the end of each year at 3% to provide the required funds at the end of that time?

7. For each of the following, find the annuity which will provide that amount at the rate and in the time given.

No.	AMOUNT OF THE ANNUITY	TYPE OF ANNUITY	RATE	TIME	ANNUITY	
1	\$ 5,000	Ordinary Annuity	3%	20 years		
2	10,000	Annuity Due	6%	10 "		
3	8,500	Ordinary Annuity	4%	15 "		
4	12,500	Ordinary Annuity	5%	25 "		
5	22,500	Annuity Due	3%	35 "		
6	9,000	Annuity Due	5%	18 "		
7	6,750	Ordinary Annuity	6%	12 "		
8	11,250	Annuity Due	4%	16 "		
9	20,000	Ordinary Annuity	3%	20 "		
10	14,000	Annuity Due	5%	30 "		

## PRESENT VALUE OF AN ANNUITY

### Calculating the Present Value of an Annuity

EXAMPLE—A person has the option of receiving an annuity of \$100 at the end of each year for 3 years or of taking an equivalent value now. What would be the present value of the annuity?

The first step in the solution is to find the amount of the annuity 3 years from now; the second step is to find the present value of that amount.

STEP 1—Amount of an ordinary annuity of \$1 for 3 years at 3% is \$3.0909.  
(See Table for the Amount of an Annuity of \$1.)

Amount of an ordinary annuity of \$100 for 3 years at 3% is  $100 \times 3.0909 = \$309.09$ .

STEP 2—\$1.00 at 3% for 3 years amounts to \$1.092727.  
(See Table for the Amount of \$1.)

Since \$1.092727 has a present value of	\$1.00,
\$1.00 has a present value of	$\frac{\$1.00}{1.092727}$
And \$309.09 has a present value of	$\frac{309.09 \times 1.00}{1.092727} = \$282.86$ .

If the annuity concerned is an *annuity due*, the form of solution is the same as above except that for Step 1 the amount of the annuity obtained will be that of an annuity due instead of an ordinary annuity.

1. An agreement is made to buy property by paying \$1,500 at the end of each year for 5 years, with the option of paying the equivalent value of this plan as an immediate cash settlement. If money is worth 5%, what would be the amount of the immediate cash settlement?

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2. Find the present value of an annuity of \$1,000 to run for 15 years, calculated at 4% per annum the first payment to be made at the end of one year from now.

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## PRESENT VALUE OF AN ANNUITY

3. A person has the option of taking an annuity of \$1,200 a year, payable at the beginning of each year for 20 years. Money is worth 5% per annum, what is an equivalent immediate cash settlement?

4. A legacy provided that a beneficiary could either take an annual payment of \$400 at the beginning of each year for 10 years or an immediate cash settlement based on an interest rate of 6%. If the cash option is chosen, how much would be received?

5. Find the present value of each of the following annuities.

No.	ANNUITY	TYPE OF ANNUITY	RATE	TIME	PRESENT VALUE	
1	\$ 200	Ordinary Annuity	5%	10 years		
2	450	Annuity Due	6%	15 "		
3	500	Ordinary Annuity	3%	8 "		
4	750	Annuity Due	4%	12 "		
5	800	Ordinary Annuity	5%	20 "		
6	900	Annuity Due	6%	18 "		
7	1,000	Ordinary Annuity	3%	16 "		
8	675	Annuity Due	4%	14 "		
9	1,200	Ordinary Annuity	5%	9 "		
10	150	Annuity Due	6%	25 "		

# GENERAL PRACTICE IN FUNDAMENTAL OPERATIONS

1. Add the following columns of figures and check.

(a)	(b)	(c)	(d)	(f)	(g)
2846.16	2846.98	1462.85	2846.21	7564.97	2948.19
1482.16	9876.45	3826.97	3756.45	9867.45	2653.45
7564.78	3546.98	9867.23	3647.16	2957.46	4738.12
9780.87	1574.97	9574.21	1264.68	4738.95	8614.39
4835.25	3546.26	2745.67	7564.97	8679.79	4967.46
5768.90	5784.90	4635.17	4869.26	4466.44	8866.46
5577.45	2233.56	8686.86	3645.58	1212.38	9067.48
7446.66	5576.33	2856.96	9087.60	4860.60	2645.17
8576.34	2039.48	4857.61	1657.10	1375.35	2548.45
4684.33	1145.34	5674.65	7548.90	2530.15	9547.12
9576.03	4535.66	3278.55	6857.44	9595.33	1236.88
1365.38	8576.24	2534.98	2948.38	3647.14	7904.02
9475.28	1371.51	1791.41	1483.12	9101.10	5861.23
7746.28	9576.27	3095.70	2746.10	3759.94	3857.95
1486.37	7896.01	2749.85	9247.14	5847.30	3857.12
9574.12	4657.38	4867.49	9576.35	2851.41	1264.75
6758.48	1136.34	3851.39	4161.39	2749.80	2841.50

2. Total vertically and horizontally and prove by totals.

No.	(1)	(2)	(3)	(4)	(5)	(6)		
1	\$324.56	\$167.25	\$ 57.45	\$ 4.78	\$ 28.75	\$852.15	\$	
2	76.85	84.29	47.24	15.30	138.46	93.50		
3	9.55	14.32	147.38	243.55	58.60	129.50		
4	45.00	7.25	36.75	89.15	95.40	29.55		
5	225.30	195.65	8.70	150.00	147.85	256.30		
6	77.20	54.36	16.48	88.35	95.38	33.60		
7	168.39	143.22	325.40	9.50	4.33	148.12		
8	48.90	56.75	75.25	16.00	348.52	99.87		
9	157.47	432.56	369.45	185.38	55.70	265.36		
10	33.75	7.25	3.20	53.15	9.00	88.35		
11	535.00	375.75	285.50	110.70	150.75	250.00		
12	19.95	56.46	83.20	74.31	345.22	78.56		
13	7.88	3.27	199.50	66.42	77.38	9.55		

# REVIEW ASSIGNMENTS

(UNITS 1 TO 10)

## UNIT 1 — FUNDAMENTAL OPERATIONS

1. Use short methods for the following calculations.

(1) $536 \times 25$	(2) $235 \times 99$
(3) $4250 \div 25$	(4) $2640 \div 125$

2. Solve:

(1) $\frac{2}{3}$ of $3\frac{1}{3} \div 1\frac{1}{3}$	(2) $\frac{1}{3} + \frac{3}{4} \times \frac{2}{3} - \frac{1}{6}$
(3) $\frac{786.50}{1 + 6\% \times 3.5}$	(4) $\frac{878 \frac{1}{20}}{1 + \frac{5\frac{1}{2}}{100} \times \frac{219}{365}}$

5. 84 is what per cent larger than 60?

6. What number increased by 20% of itself equals 150?

7. What number is 50% more than 50?

8. 10 litres are equal to how many gallons?

9. 1500 metres equal how many yards?

10. One ton equals how many kilograms?

## UNIT 2 — MISCELLANEOUS TOPICS

1. The marks of 15 students in an Arithmetic test are as follows: 78, 91, 49, 63, 59, 80, 45, 56, 68, 75, 65, 92, 73, 62, 64. Find (a) the average mark; (b) the median mark.

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2. Find the storage charge at the end of the month, assuming that the charge is 9 cents a day-unit for a 30-day period.

DATE	UNITS RECEIVED	UNITS DELIVERED	BALANCE	NO. OF DAYS STORED	NO. OF DAY-UNITS
Oct. 1	125				
10		25			
15	80				
20		125			
30		55			
Total No. of Day-Units					
Storage Charge for the Month					

3. Using the following data, find the cost per mile of operating the automobile. Use the space to the right for your rough calculations.

Cost of the automobile.....	\$3,200.00
Depreciation rate for the year.....	30%
Mileage for the year.....	10,500
Average mileage per gallon of gasoline.....	17
Average price of gasoline per gallon.....	44.5¢
Number of lubrication services at \$4 each.....	10
Insurance cost for the year.....	\$90.00
Garage rent per month.....	\$ 6.00
Repairs and seasonal changeover.....	\$82.00
Loss of interest on money invested in the automobile — rate per annum.....	5%

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UNIT 3 — MERCHANDISING

1. A manufacturer's list price of certain goods to the retail trade was \$25 less 10% and 10%. If the goods cost him \$16.20, what was his per cent of markup?

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3. A merchant operates on a 40% gross margin on sales. What is the amount of markup on goods that cost him \$240?

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5. At what price must a manufacturer list goods which cost him \$15 to produce to allow him to give trade discounts of 15% and 10%, and still realize a markup of  $33\frac{1}{3}\%$  on cost?

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2. The retailer who bought the goods listed in Problem 1 paid \$1.25 freight. He then marked up his laid-down cost by 40%. What was the retail price?

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4. A merchant marks up his goods  $33\frac{1}{3}\%$  of cost. What is his gross margin per cent on sales?

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6. A retailer obtained goods listed at \$20 less 10% and 5%. At what price must he sell the goods so that he can realize a gross margin on sales of 25%?

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# UNIT 4 — SIMPLE INTEREST

1. Find the simple interest on \$275 at  $5\frac{1}{2}\%$  for 6 years.

2. Find the interest on \$1,550 at 6% from June 7 to October 31 of the same year.

3. At what rate will \$375 earn \$11.25 interest in 6 months?

4. What principal will earn \$33.75 interest at 6% in  $1\frac{1}{2}$  years?

5. In how many years will \$450 earn \$67.50 interest at 5% per annum?

6. In how many days will \$500 earn \$12 at 6% per annum?

7. What principal will amount to \$952 in 3 years at 4% simple interest per annum?

8. Thirty days from today, A has to pay B \$100. What amount will settle the debt today, assuming that they agree on a settlement based on a 6% rate?

9. On October 10, A sold at his bank four \$100 Dominion of Canada bearer bonds bearing interest at 3%. Coupon dates were June 30 and December 31. Market price at the time of sale was  $95\frac{3}{8}$ . Find the proceeds of the sale.

10. On November 5, B sold a \$1,000 bond at par. Coupons bore interest at  $2\frac{3}{4}\%$ , payable March 31 and September 30. Find the proceeds of the sale.

UNIT 4 — PARTIAL PAYMENTS ON DEMAND NOTES AND DISCOUNT

1. On July 1, A borrowed \$500 from B, giving a demand note bearing interest at 6% per annum. Payments (including accrued interest) were made as follows: August 1, \$150; September 1, \$150. On November 1, the balance of the note and interest accrued were paid in full. What was the amount of the payment?

2. A borrowed \$1,000 from his bank, giving a note dated October 1, payable three months after date. The bank discounted the note immediately at 6%. Calculate the proceeds.

3. A drew a draft on B for \$750, dating it April 16, and making it payable three months after date. On June 20 of the same year, A discounted the draft at his bank at 6% and deposited the proceeds. What were the proceeds?

#### UNIT 4 — BANK DISCOUNT AND CREDIT RATES

1. A promissory note for \$250, dated June 6, payable three months after date, and bearing interest at  $4\frac{1}{2}\%$  per annum, was discounted at  $6\%$  on June 28 of the same year. What were the proceeds?

2. Find the proceeds from discounting a 90-day promissory note for \$100, dated August 1, and bearing interest at  $6\%$ . The discount date was also August 1 of the same year, and the discount rate was  $6\%$ .

3. A borrowed \$600 from a finance company. The loan was to be paid back in 15 monthly payments of \$44.12 each. What was the credit rate?

4. A woman purchased an electric washer priced at \$260. Terms were  $10\%$  down and payments of \$25 at the end of each month for ten consecutive months. What was the credit rate?



UNIT 5 — REAL PROPERTY — INSURANCE AND TAXES

1. What amount of insurance can be obtained for a premium of \$189 if the rate is \$1.05 per \$100 for a 3-year term?

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3. A building having an appraised value of \$125,000 is insured for \$105,000 under an 80% co-insurance policy. If fire causes a loss of \$50,000, how much will be recovered from the insurance company?

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5. A city having a total assessment of \$180,500,000 must raise \$10,378,750 by property tax. What mill rate is necessary?

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2. Which is the lesser rate and by how much per \$100: A \$12,000 policy with premium of \$108, or a \$15,000 policy with premium of \$127.50?

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4. If, in Problem 3, the policy were \$90,000, how much would be recovered?

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6. In city X, with a tax rate of 40 mills, the tax on a certain house was \$260. In city Y, the rate was 50 mills, but the tax on an identical house was also \$260. Compare the assessments in the two cities.

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7. A city having a total assessment of \$175,000,000 needed a tax rate of 58 mills to raise sufficient revenue. A grant of \$525,000 from the provincial government allowed the tax rate to be reduced accordingly. What reduction in rate was possible?

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## UNIT 5 — REAL PROPERTY — RENTAL AND PURCHASE

1. A has the choice of selling his property for \$12,500 cash and of investing the proceeds at 6% per annum, or of renting the property for \$100 a month. If he rents, he will have to meet the following expenses annually: Taxes, based on an assessment of \$5,500 at a rate of 57 mills; insurance premiums on a \$12,000 policy at 75 cents per \$100 for a three-year term; annual repairs and depreciation calculated at 2% of the value of the property (\$12,500). Compare the net annual income in each case.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins or other markings visible.

2. A purchased a house from B for \$10,500, paying \$300 down with his offer of purchase. Final settlement is to be made as of March 1, 1957. The following facts are to be considered in determining the amount of the final settlement:

- (a) There is a mortgage against the property of \$5,800 bearing interest at  $5\frac{1}{2}\%$ . This balance dates from September 30, 1956. The next payment of accrued interest and \$100 on the principal has to be made on March 31. A agrees to assume the obligation on this mortgage.
- (b) Taxes for 1956 were paid in full; no taxes have been paid for 1957. The assessment on the property is \$5,200 and the rate is 56 mills. Annual improvement taxes are \$8.50.

What is the amount of settlement?

[illegible]

UNITS 6 AND 7 — PAYROLL AND INCOME TAX RETURNS

1. John X works for the A.B.C. Construction Co. (See page 55 for conditions of employment). His hourly rate is \$1.90. His time card for the week shows the following times of arrival in the morning and of departure in the afternoon: Monday, 7:22 and 4:03; Tuesday, 7:50 and 4:04; Wednesday, 7:25 and 4:02; Thursday, 7:25 and 6:02; Friday, 7:29 and 4:02; Saturday, 7:28 and 4:03. Deductions from pay are: Income tax, \$15.60, and the usual unemployment insurance and vacation pay allowances (See Unit 6 for rates and procedure). Calculate the amount of John's take-home pay for the week.

2. Using the following information calculate the balance of income tax payable for the current year by Mr. B: T4 slip from his employer shows total wages before any deductions, \$4,880; total exemptions, \$2,150; deductions from pay made at source, \$135 for registered pension fund, \$24 for allowable union dues, \$409.30 for income tax. Mr. B has also received \$105 interest on Dominion of Canada bonds. He has receipts for charitable donations totalling \$75.

3. Find the capital cost allowance in 1959 on equipment purchased in January, 1957 at a cost of \$5,200. Use an allowance rate of 30%.

## UNIT 8 — STOCK TRANSACTIONS

1. A man sold 80 shares of a 6% preferred stock at \$108 a share and invested the proceeds in a 5% stock at \$81. The fractional part of a share was not purchased, the broker turning over to the client the difference involved. (See pages 69 to 71 for brokerage rates and transfer tax rates.)

- How many shares of 5% stock did he buy?
- What change did he make in his annual income from dividends?
- Compare the yield of the two stocks.

2. On June 1, A deposited with his broker \$2,000 for the purchase of 200 shares of stock at \$43 a share. Thirty days later he sold 100 shares at \$45, and on August 18, he sold the remaining 100 shares at \$44 a share. Brokerage rates were 40 cents a share for each transaction. The broker's interest rate was 6%. How does the account now stand? (Ignore transfer tax in this problem.)

[illegible]



UNIT 9 — COMPOUND INTEREST

1. To what amount would \$150 accumulate in 18 years at 3% compound interest?

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2. To what amount would \$150 accumulate in 18 years at 3% compounded semi-annually?

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3. Find the interest on \$1,200 at 5% compounded annually for  $10\frac{1}{2}$  years.

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4. What sum invested at 4% compounded annually for 15 years will amount to \$900.47?

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5. What sum invested at 6% compounded semi-annually for 12 years will amount to \$1,000?

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6. A man has the option of receiving \$2,000 five years from now or of taking an immediate cash settlement based on an interest rate of 5%. What would be the amount of the cash settlement?

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## UNIT 9 — ANNUITIES

1. If \$200 is invested at the end of each year to earn interest compounded annually at 5%, what will be the accumulated total at the end of 20 years?

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2. If \$200 is invested at the beginning of each year to earn interest compounded annually at 5%, what will be the accumulated total at the end of 20 years?

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3. What sum deposited at the end of each year for 15 years, to earn interest at 6% compounded annually, would amount to \$20,000?

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4. What sum deposited at the beginning of each year for 15 years, to earn interest at 6% compounded annually, would amount to \$20,000?

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5. A person has the choice of taking an annuity of \$1,000 a year payable at the end of each year for 10 years, or of taking an equivalent settlement now based on an interest rate of 6%. What would be the amount of the equivalent settlement?

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# APPENDICES

## WEIGHTS AND MEASURES—THE ENGLISH SYSTEM

### Length

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
5½ yards	= 1 rod (rd.)
320 rods	= 1 mile (mi.)
1 mile	= 1760 yards
1 furlong	= 220 yards
1 fathom (used to measure depth at sea)	= 6 feet
1 knot	= 6080 feet

### Area

144 square inches (sq. in.)	= 1 sq. foot
9 square feet	= 1 sq. yard
30¼ square yards	= 1 sq. rod
160 square rods	= 1 acre
640 acres	= 1 sq. mile
4840 square yards	= 1 acre

### Volume

1728 cubic inches (cu. in.)	= 1 cu. foot
27 cubic feet	= 1 cu. yard
1 cord (used in measuring wood)	= 128 cu. feet
A cord of wood is 8 feet long, 4 feet wide and 4 feet high.	

### Avoirdupois Weight

16 ounces (oz.)	= 1 pound (lb.)
100 pounds	= 1 cwt.
2000 pounds	= 1 ton
1 pound	= 7000 grains (gr.)
1 ounce	= 437½ grains
1 long ton	= 2240 pounds

### Troy Weight

(used for weighing gold, silver and jewels)	
24 grains	= 1 pennyweight
20 pennyweights (dwt.)	= 1 ounce
12 ounces	= 1 pound
1 lb. Troy	= 5760 grains
1 oz. Troy	= 480 grains
The weight of diamonds is expressed in carats (k). 1 carat is about 3.17 grains.	

The fineness of gold is also expressed in carats. Thus, 18k gold is 18/24 by weight pure gold, the remaining 6/24 being of some other metal.

### Liquid Measure

4 gills	= 1 pint (pt.)
2 pints	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)
6¼ gal. (Can.) in volume	= 1 cu. foot (approx.)
1 gal. (Can.) in volume	= 277.274 cu. inches
1 gal. (U.S.) in volume	= 231 cu. inches
1 gallon water weighs 10 pounds.	

### Dry Measure

2 pints	= 1 quart
4 quarts	= 1 gallon
2 gallons	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

Bushels by weight are as follows:

Barley	= 48 lb.	Oats	= 34 lb.
Beans	= 60 lb.	Onions	= 50 lb.
Beets	= 50 lb.	Parsnips	= 45 lb.
Buckwheat	= 48 lb.	Peas	= 60 lb.
Carrots	= 50 lb.	Potatoes	= 60 lb.
Corn	= 56 lb.	Wheat	= 60 lb.

### Number

12 articles	= 1 dozen (doz.)
12 dozen	= 1 gross (gro.)

### Paper

24 sheets	= 1 quire
20 quires	= 1 ream

### Angles

60 seconds	= 1 minute
60 minutes	= 1 degree
360 degrees	= 1 circle
1 right angle	= 90 degrees

### Lumber

The unit of measure of lumber is the board foot. To calculate the board feet in a piece of lumber, multiply the length in feet by the width in feet, and the result by the thickness in inches.

A piece of lumber 12 inches wide, 12 feet long and 1 inch thick measures 12 board feet.

## WEIGHTS AND MEASURES—THE METRIC SYSTEM

The metric system of weights and measures is used chiefly in the countries of Europe. The English system is used in Britain, Canada and the United States. However, for scientific purposes, the metric system is used almost universally.

### Length

10 millimetres	= 1 centimetre
10 centimetres	= 1 decimetre
10 decimetres	= 1 metre
1,000 metres	= 1 kilometre

### Area

100 square metres	= 1 are
100 ares	= 1 hectare

### Volume

1,000 cu. centimetres	= 1 litre
1,000 litres	= 1 kilolitre
1 kilolitre	= 1 cubic metre

### Weight

10 milligrams	= 1 centigram
10 centigrams	= 1 decigram
10 decigrams	= 1 gram
1,000 grams	= 1 kilogram

### Relation of Some of the English and Metric Units

#### 1. METRIC UNITS IN ENGLISH UNITS (approximately)

1 metre	= 39.37 inches
1 kilometre	= $\frac{5}{8}$ mile
1 are	= 119.6 square yards
1 hectare	= 2.47 acres
1 litre	= 1.76 pints
1 gram	= 15.432 grains
1 kilogram	= $2\frac{1}{8}$ pounds (avoir.)

#### 2. ENGLISH UNITS IN METRIC UNITS (approximately)

1 yard	= .9144 metres
1 mile	= 1.609 kilometres
1 sq. yd.	= .83612 sq. metres
1 acre	= .4047 hectares
1 gallon	= 4.546 litres
1 pound (avoir.)	= .4536 kilograms



THE COMPOUND AMOUNT OF \$1

YEARS	1½%	2%	3%	4%	5%	6%	YEARS
1	1.015000	1.020000	1.030000	1.040000	1.050000	1.060000	1
2	1.030225	1.040400	1.060900	1.081600	1.102500	1.123600	2
3	1.045578	1.061208	1.092727	1.124864	1.157625	1.191016	3
4	1.061364	1.082432	1.125509	1.169859	1.215506	1.262477	4
5	1.077284	1.104081	1.159274	1.216653	1.276282	1.338226	5
6	1.093443	1.126162	1.194052	1.265319	1.340096	1.418519	6
7	1.109845	1.148686	1.229874	1.315932	1.407100	1.503630	7
8	1.126493	1.171659	1.266770	1.368569	1.477455	1.593848	8
9	1.143390	1.195093	1.304773	1.423312	1.551328	1.689479	9
10	1.160541	1.218994	1.343916	1.480244	1.628895	1.790848	10
11	1.177949	1.243374	1.384234	1.539454	1.710339	1.898299	11
12	1.195618	1.268242	1.425761	1.601032	1.795856	2.012197	12
13	1.213552	1.293607	1.468534	1.665074	1.885649	2.132928	13
14	1.231756	1.319479	1.512590	1.731676	1.979932	2.260904	14
15	1.250232	1.345868	1.557967	1.800944	2.078928	2.396558	15
16	1.268986	1.372786	1.604706	1.872981	2.182875	2.540352	16
17	1.288020	1.400241	1.652848	1.947901	2.292018	2.692773	17
18	1.307341	1.428246	1.702433	2.025817	2.406619	2.854339	18
19	1.326951	1.456811	1.753506	2.106849	2.526950	3.025600	19
20	1.346855	1.485947	1.806111	2.191123	2.653298	3.207136	20
21	1.367058	1.515666	1.860295	2.278768	2.785963	3.399564	21
22	1.387564	1.545980	1.916103	2.369919	2.925261	3.603537	22
23	1.408377	1.576899	1.973587	2.464716	3.071524	3.819750	23
24	1.429503	1.608437	2.032794	2.563304	3.225100	4.048935	24
25	1.450945	1.640606	2.093778	2.665836	3.386355	4.291871	25
26	1.472710	1.673418	2.156591	2.772470	3.555673	4.549383	26
27	1.494800	1.706887	2.221289	2.883369	3.733456	4.822346	27
28	1.517222	1.741024	2.287928	2.998703	3.920129	5.111687	28
29	1.539981	1.775845	2.356566	3.118652	4.116136	5.418388	29
30	1.563080	1.811362	2.427263	3.243398	4.321942	5.743491	30
31	1.586526	1.847589	2.500080	3.373133	4.538040	6.088101	31
32	1.610324	1.884541	2.575083	3.508059	4.764942	6.453387	32
33	1.634479	1.922231	2.652335	3.648381	5.003189	6.840590	33
34	1.658996	1.960676	2.731905	3.794316	5.253348	7.251025	34
35	1.683881	1.999890	2.813863	3.946089	5.516015	7.686087	35
36	1.709140	2.039887	2.898278	4.103933	5.791816	8.147252	36
37	1.734777	2.080685	2.985227	4.268090	6.081407	8.636087	37
38	1.760798	2.122299	3.074784	4.438814	6.385477	9.154252	38
39	1.787210	2.164745	3.167027	4.616366	6.704751	9.703508	39
40	1.814018	2.208040	3.262038	4.801021	7.039989	10.285718	40

THE AMOUNT OF AN ANNUITY OF \$1

YEARS	1½%	2%	3%	4%	5%	6%	YEARS
1	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1
2	2.015000	2.020000	2.030000	2.040000	2.050000	2.060000	2
3	3.045225	3.060400	3.090900	3.121600	3.152500	3.183600	3
4	4.090903	4.121608	4.183627	4.246464	4.310125	4.374616	4
5	5.152267	5.204040	5.309136	5.416323	5.525631	5.637093	5
6	6.229551	6.308121	6.468410	6.632976	6.801913	6.975319	6
7	7.322994	7.434283	7.662462	7.898295	8.142009	8.393838	7
8	8.432839	8.582969	8.892336	9.214226	9.549109	9.897468	8
9	9.559332	9.754628	10.159106	10.582795	11.026564	11.491316	9
10	10.702722	10.949721	11.463879	12.006107	12.577893	13.180795	10
11	11.863263	12.168715	12.807796	13.486351	14.206787	14.971643	11
12	13.041211	13.412090	14.192030	15.025806	15.917127	16.869941	12
13	14.236830	14.680332	15.617790	16.626838	17.712983	18.882138	13
14	15.450382	15.973938	17.086324	18.291911	19.598632	21.015066	14
15	16.682138	17.293417	18.598914	20.023588	21.578564	23.275970	15
16	17.932370	18.639285	20.156881	21.824531	23.657492	25.672528	16
17	19.201355	20.012071	21.761588	23.697512	25.840366	28.212880	17
18	20.489376	21.412312	23.414435	25.645413	28.132385	30.905653	18
19	21.796716	22.840559	25.116868	27.671229	30.539004	33.759992	19
20	23.123667	24.297370	26.870375	29.778079	33.065954	36.785591	20
21	24.470522	25.783317	28.676486	31.969202	35.719252	39.992727	21
22	25.837580	27.298984	30.536780	34.247970	38.505214	43.392290	22
23	27.225144	28.844963	32.452884	36.617889	41.430475	46.995828	23
24	28.633521	30.421863	34.426470	39.082604	44.501999	50.815577	24
25	30.063024	32.030300	36.459264	41.645908	47.727099	54.864512	25
26	31.513969	33.670906	38.553042	44.311745	51.113454	59.156383	26
27	32.986679	35.344324	40.709634	47.084214	54.669126	63.705766	27
28	34.481479	37.051210	42.930923	49.967583	58.402583	68.528112	28
29	35.998701	38.792235	45.218850	52.966286	62.322712	73.639798	29
30	37.538681	40.568079	47.575416	56.084938	66.438848	79.058186	30
31	39.101762	42.379441	50.002678	59.328335	70.760790	84.801677	31
32	40.688288	44.227030	52.502759	62.701469	75.298829	90.889778	32
33	42.298612	46.111570	55.077841	66.209527	80.063771	97.343165	33
34	43.933092	48.033802	57.730177	69.857909	85.066959	104.183755	34
35	45.592088	49.994478	60.462082	73.652225	90.320307	111.434780	35
36	47.275969	51.994367	63.275944	77.598314	95.836323	119.120867	36
37	48.985109	54.034255	66.174223	81.702246	101.628139	127.268119	37
38	50.719885	56.114940	69.159449	85.970336	107.709546	135.904206	38
39	52.480684	58.237238	72.234233	90.409150	114.095023	145.058458	39
40	54.267894	60.401983	75.401260	95.025516	120.799774	154.761966	40

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